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Thematic Focus: Environmental governance, Resource efficiency, Ecosystem management

The Rush for Land and Its Potential Environmental Consequence

Why is this issue important?

To feed a global population of 9.3 billion by 2050 (2.4 billion more than today, UNPD 2011) FAO estimates that global food demand will increase by 70 per cent (FAO 2009). Net investment in agriculture needs to exceed US$83 billion per year (50 per cent above current levels) to meet future demand (FAO 2009, OECD-FAO 2010). FAO projected that more than 80 per cent of future arable land expansion would take place in Latin America and Sub-Saharan Africa (Bruinsma 2009) (Figure 1), although both climate change and population growth will cause reductions in arable land in the same regions by the end of the 21st century (Zhang and Cai 2011).

In addition to the need for more agricultural production, a rise in food prices is contributing to concerns about global food security. Increasing urbanisation rates and changing diets in fast-growing developing economies are pushing up global food prices considerably (Cotula and others 2009, Zoomers 2010). A 50–200 per cent increase in food prices led to the global food crisis of 2008, with dramatic impacts on the lives and livelihoods of millions of people (FAO 2009, OECD-FAO 2010). Even after the price spike, the U.N. Food Price Index eclipsed its previous all-time global high, and by April 2011, it had climbed for ten consecutive months (FAO 2011).

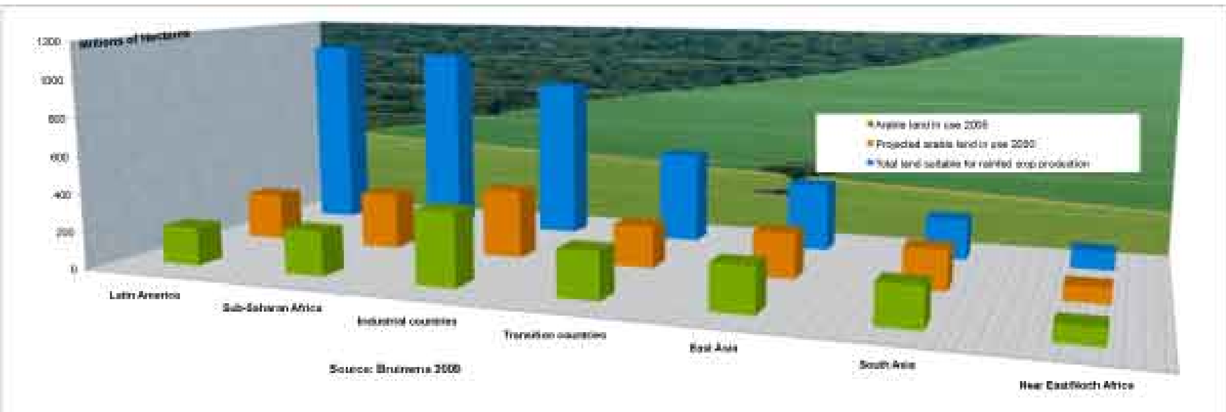

Figure 1: Arable land in use in 2005, and projected use by 2050 compared with total land suitable for rain-fed crop production [Full Size Image](#)

The rise in biofuel farming was seen as another contributor to the 2008 price hikes (Cotula and others 2009, Fairley 2011). Calculations suggest that achieving even modest greenhouse-gas reductions combined with successful development of second generation biofuels, could lead to 1500 million hectares of land being devoted to biofuel cultivation by the year 2050—a land area equivalent to the current global arable land (Field and others 2007).

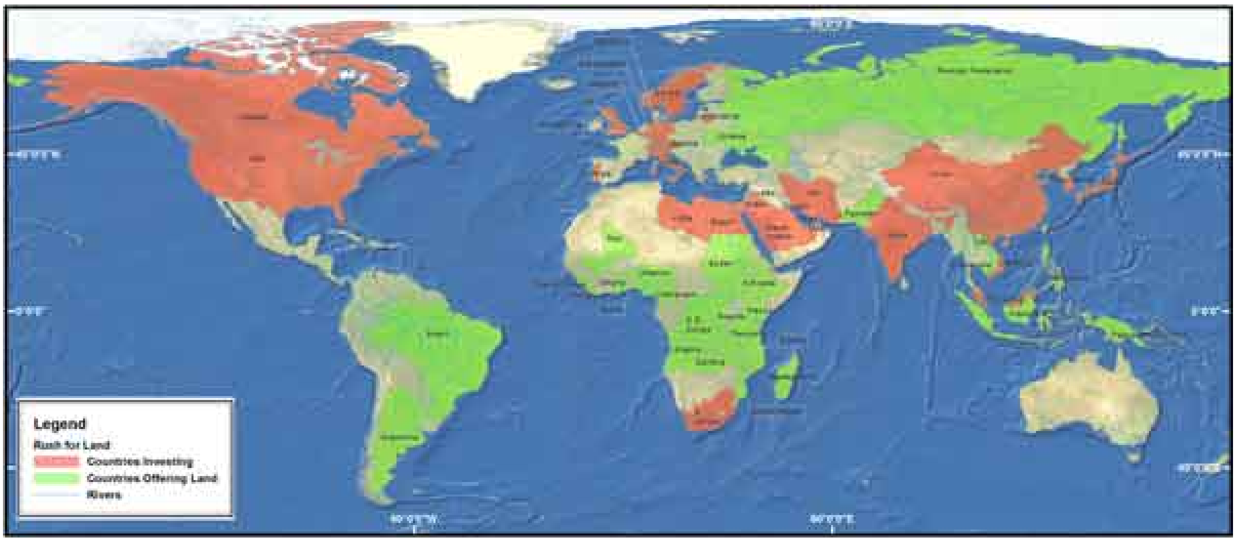

Figure 2: Investor countries and target countries in overseas land investment for agricultural production. Source: UNCTAD 2009, Cotula and others 2009, Deininger and Byerlee 2011, OI, 2011, IFPRI.ORG (accessed 8 June 2011) Full Size Image

Targets and mandates on renewable fuels introduced by several countries and States including the European Union, Canada, USA, China, India, and Japan have created a guaranteed market that has encouraged investment in biofuels production, both in Europe and overseas. The European Union, for example, has set a target of 10 per cent biofuel use in the transport sector by 2020 (IIASA 2009, IEA 2011).

Investor Country	Target Country	Area (Ha)	Crop - Aim of Project
Austria	Ethiopia	50,000	Biofuel
Bahrain	Philippines, Turkey, UAE	10,000	Agro-fishery
Belgium	Kenya	42,000	Sugarcane
Canada	Kenya, Mozambique, Ghana	293,000	Biofuel
China	DR Congo, Mozambique, Tanzania, Zambia, Philippines, Cameroon, Sierra Leone	6,512,300	Biofuel, rice, sugarcane, maize
Egypt	Sudan	526,000	wheat, maize, sugar beets
Germany	Ethiopia	13,000	Biofuel
India	Ethiopia, Sierra Leone	348,258	Flower, sugar, maize, rice, vegetables, Palm oil
Iran	Sierra Leone	10,117	Biofuel, lemon grass
Israel	Ghana, Ethiopia	202,000	Biofuel
Italy	Ghana, Mozambique	20,000	Biofuel
Japan	Brazil, Kenya	100,000	Soybeans, biofuel
Jordan	Sudan	25,000	Livestock, crops
Kuwait	Kenya, Sudan	170,000	Rice
Libya	Mali, Ukraine, Liberia	364,000	Rice
Luxembourg	Sierra Leone	62,475	Biofuel, Palm oil, rubber
Norway	Ghana	427,660	Biofuel
Portugal	Mozambique, Sierra Leone	151,000	Biofuel, rice, pineapple, cassava, vegetables
Qatar	Philippines, Sudan, Kenya	140,000	Fruits, vegetables
Republic of Korea	Russia, Sudan, Indonesia,	715,000	Wheat, palm oil
Saudi Arabia	Sudan, Tanzania, Indonesia, Ethiopia, Egypt	5,520,000	Rice, wheat, vegetables, barley, animal feeds
South Africa	Congo (Brazzaville), Benin	80,000	Livestock, rice, vegetables
Switzerland	Sierra Leone	26,000	Sugarcane
UAE	Pakistan, Sudan, Ethiopia	707,000	Corn, alfalfa, wheat, potatoes, beans
UK	Ethiopia, Angola, Ghana, Madagascar, Mozambique, Ukraine, Sierra Leone	1,046,348	Biofuel
USA	Brazil, Sudan, Ukraine, Ethiopia	690,000	Sugarcane (biofuel)
Viet Nam	Cambodia, Lao	200,000	Rice, rubber

Source: see Figure 2

Table 1: Major players in the rush for land Full Size Image

The impacts of climate change are also raising concerns about the future of agriculture. If no adaptation measures are put in place a temperature increase as small as 1°C by 2030 will lead to a decline in yields of major cereal crops in the tropics and subtropics. Impacts of temperature increase of 3°C or more by 2100 could result in a significant loss of productivity in low-latitude regions and diminish effectiveness of adaptation measures (Padgham 2009).

What are the findings and implications?

The 2008 food crisis accelerated the scale and intensity of transactions in farmland (Sutherland and others 2010) in the Global South. Governments, through transnational corporations and national actors have moved into large-scale agriculture, speculating on potential windfall gains in sub-sectors such as food crops, biofuels, and environmental services. Over the last five years, leases, concessions, outright land sales, and "contract farming", often covering tens to hundreds of thousands of hectares, have enabled foreign control of these lands for decades to come (Zoomers 2010, Deininger and Byerlee 2011, LRAN 2011). The media's considerable attention to the vast scale and apparent speed with which the land is being transacted has led them to coin the catch-phrase "land grabs".

The biggest players in the rush for land are China and the Gulf States, while countries such as Japan, India, South Korea, Libya and Egypt are hunting for fertile farmland in places like Ethiopia, Mali, Sudan, Madagascar, and Mozambique, as well as in the Philippines, Indonesia, Laos, Thailand, Vietnam, Cambodia, Pakistan, Brazil, Argentina and even Ukraine (Zoomers 2011, Deininger and Byerlee 2011). A number of often small European Union companies are involved, sometimes with support from their national governments (UNCTAD 2009) (Figure 2). Compared to an average annual expansion of global agricultural land of less than 4 million hectares, large-scale land transactions worth 45.2 million hectares (11.3 million ha per year) were reported between 2006-2009 (Deininger and Byerlee 2011). More than 70 per cent of the most speculative major land demands are in sub-Saharan Africa where demand alone in 2009 was equivalent to more than 20 years of previous land expansion (Deininger 2011).

Private investors interested in the biofuel boom are actively looking for land in Argentina, Brazil, Laos, Malaysia, Indonesia, and in several African countries (Figure 2 and Table 1) (Sulle and Nelson 2009, Zoomers 2010). With a guaranteed market, cheap access to land and cheap labour, transnational corporations perceive agrofuel development as a good business opportunity. A recent analysis indicates that 37 per cent of the current land transactions will be devoted to food crops, 21 per cent on biofuels, and 21 per cent on industrial or cash crops with the rest distributed among nature conservation, livestock and plantation forestry (Zoomers 2010, Deininger 2011).

The desire to capture water resources to irrigate farmlands has also motivated the rush for land (UNCTAD 2009, D'Odorico and Ridolfi 2010). Middle Eastern states are among the biggest land investors in Africa, driven not by a lack of land, but a lack of water (Bailey 2011). Between 2004 and 2009, for example, Saudi Arabia leased 376 000 ha of land in Sudan to grow wheat and rice following declining underground domestic water. China and India have leased thousands of hectares of farmland in Ethiopia; both countries have well developed irrigation systems but in the case of China, for example, moving water from the water-rich south to northern China is likely to cost more than leasing land in Africa (Ananthaswamy 2011).

Potential environmental impacts of the rush for land

Monocultures and Biodiversity loss

Monoculture has been widely accepted as the most efficient type of large-scale agriculture. Indeed, high yields may result, at least for a time, but growing one crop, such as biofuels, over a large area for several years has a number of negative environmental impacts (Rosset 2011). Studies in Malaysia and Indonesia have shown that 80-100 per cent of fauna species in tropical rainforests cannot survive in oil-palm monocultures due to increased pressures from various crop diseases and pests (Donald 2004, Fitzherbert and others 2008), often requiring large scale use of chemical pesticides, fungicides and herbicides. In addition, increased fertilizer use to safeguard crop yield may increase pollutant levels in downstream waters and nitrous oxide emissions (OI 2011a) (Table 2).

Rush for land—an opportunity and a risk

- Land acquisitions might offer possibilities for new direct investment, leading to an improved national balance of accounts and extra financial resources (Zoomers 2010);
- Growing and export of biofuels can ensure that farmers have an alternative reasonable income;
- Local populations can profit from on- and off-farm employment, better access to agricultural inputs, technology transfer, improvements in amenities and rural infrastructure development. The use of land for nature reserves can put a brake on deforestation, while farmers who wish to sell their land can profit from the rising land prices (Zoomers 2011);
- Local communities may not benefit if land transactions lack transparency, consultation, consent, and compensation and may marginalise local populations (Cotula and Vermeulen 2011);
- Large-scale, highly mechanized agriculture may damage the environment, (Zoomers 2010).
- Negative environmental impacts on woodlands, forests and pasturelands

Full Size Image

Semi-mechanized sorghum and sesame production in Sudan illustrates the risks of large-scale farming and holds lessons for current investors. In an agro-ecological environment comparable to Australia, where yields are 4 t/ha, sorghum yields are only 0.5

t/ha and have been stagnant or declining (Deininger and Byerlee 2011).

Loss of forests and pastures

Covering only about 7 per cent of the planet, tropical forests probably contain at least half of all species. Many of these species risk extinction if the forest area in which they live is destroyed (Fitzherbert and others 2008). Over the last decade, approximately 14 million hectares of forest per year has been converted to other uses or lost through natural causes, particularly in Latin America and Sub-Saharan Africa (FAO 2010) where many large-scale agricultural projects will be located.

Recent calculations suggest that carbon dioxide emissions from deforestation and forest degradation (excluding peatland emissions) contribute about 12 per cent of total anthropogenic carbon dioxide emissions with a range from 6 to 17 per cent (Werf and other 2009). Depending on the methods used to produce the feedstock and process the biofuel, some crops can even generate more greenhouse gases than do fossil fuels. For example, nitrous oxide, a greenhouse gas with a global warming potential around 300 times greater than that of carbon dioxide, is released from nitrogen fertilizers (FAO 2008).

Feedstock Type	Typical land converted or used	Impact on biodiversity
Soybean	Grassland, cultivated land, forest	Very high: agrochemicals and erosion in biodiverse ecosystems
Oil palm	Virgin forest	Very high: irreversible destruction of virgin forest (bush fires)
Sugarcane	Grassland, Cultivated land	High: monoculture, processing pollution
Maize	Cultivated land	High: monoculture, agrochemicals, erosion
Rapeseed	Cultivated land	High: monoculture, agrochemicals, erosion
Cassava	Cultivated land, grassland, forest	Neutral: competing with use as food crop
Jatropha	Grassland, cultivated land	Neutral: monocultures, socioeconomic and agro-economic uncertainties, toxic, invasive.

Table 2: Feedstock specific biodiversity effects. Source: IIASA, 2009 Full Size Image

Much of the land area under biofuel crops will come at the expense of forests and pasture (Melilo and others 2009, Fairley 2011). For example, the expansion of soya beans and sugarcane for the production of agro-fuels in Brazil has destroyed protected areas of the Amazon and Cerrado (Mendonça 2011). The Cerrado (savannah) holds nearly 160 000 species of plants and animals, many of which are endangered. Studies indicate that nearly 22 000km^2 of savannah are cleared each year for sugarcane production (Mendonça 2011). With technological advances, use of biofuels in transport is expected to increase from the current 2 per cent to 27 per cent by the year 2050 (Fairley 2011).

At least 55-59 per cent of oil palm expansion in Malaysia and 56 per cent in Indonesia has been at the expense of forests (Koh and Wilcove 2008). Deforestation is one of the major environmental threats facing Ethiopia. Much of the land that has been given to investors (and that is marketed as available) is not presently under cultivation, rather much of it is covered by woodland or forest (OI 2011a).

Increased competition for water resources

Large-scale acquisitions of farmland will stimulate further competition for water, a situation that can only become worse in the future if the global demand for sustainable bioenergy production is taken into account (Rost and others 2009). In Ethiopia, for example, several key wetland areas have been given to investors and evidence of limits on water use are lacking. Further, of the lands listed as available for large-scale commercial agriculture, more than 70 per cent, or 1.5 million hectares, are located within the Nile watershed (OI 2011a). Ethiopia constitutes about 90 per cent of the total flow of the Nile and impacts of water use on downstream users in the future may raise concerns.

Similarly, the intention of the government of Mali is to extend the irrigated area from the current 100,000 ha to 960,000 ha through large land leases. This will involve a massive increase in the amount of water extracted from the Niger River, which is shared by nine countries within its watershed—Benin, Burkina Faso, Cameroon, Chad, Côte d'Ivoire, Guinea, Mali, Niger, and Nigeria (OI 2011b).

To meet the water and food needs of local communities, farming away from industrial, energy-intensive agriculture towards small-scale, agro-ecological farming has been proposed (IAASTD 2009), including improved water use in agriculture (IWMI 2007).

Legal and policy options

Governments that rely on imports to feed their populations and countries with large populations and food security concerns need a long-term strategy to secure greater food security in the future. Therefore, interest in land acquisition is likely to continue.

Host countries should clearly communicate to potential foreign investors their comprehensive economic plans in line with the country's sustainable development agenda, policies and laws (in water, land, forests, etc.). The plans should encompass systematic land use regimes, assessments of land rights and consent to land and associated natural resources, including technical and economic viability of the land. Host countries need to enhance their policy, legal and institutional capacity to manage their land transactions. Transparent, consultative negotiations in major land concessions are essential to obtain the best fiscal, social and environmental provisions.

Environmental policies and regulations have to be clearly articulated, implemented and enforced in the host countries. High quality environmental impact assessments (EIAs) should be conducted and vetted in a public process before any licensing and approval procedures are implemented. EIAs should be supplemented by social impact assessments and periodic, independent inspection to ensure environmental sustainability. Protected areas should be demarcated and areas unsuitable for agricultural expansion monitored against encroachment. The impacts of water use on downstream users, whether those users are immediately downstream, or in other countries should be assessed as a matter of priority.

References

Ananthaswamy, A. (2011). African land grab could lead to future water conflicts. New Scientist No. 2814, 28 May 2011. http://www.newscientist.com/article/mg21028144.100-african-land-grab-could-lead-to-future-water-conflicts.html (accessed 3 June 2011)

Bailey R. (2011). Growing a Better Future: Food justice in a resource-constrained world. Oxfam, UK. http://www.oxfam.org.uk/resources/papers/downloads/cr-growing-better-future-170611-en.pdf (accessed 24 June 2011)

Baudet, M-B. and Clavreul, L. (2009). "The Growing Lust for Agricultural Lands," Le Monde, April 14, 2009, http://www. truthout.org/041509F in Kugelman, M. (2009). Land Grab? The race for the World's Farmland. www.wilsoncenter.org/topics/.../ASIA_090629_Land%20Grab_rpt.pdf (Accessed on June 13, 2011).

Bruinsma, J. (2009). The resource Outlook to 2050: by how much do land, water use and crop yields need to increase by 2050? Paper presented at the Expert meeting on how to feed the world in 2050. Rome: Food and Agriculture Organization of the United Nations.

Cotula, L., Vermeulen, S., Leonard, R. and Keeley, J. (2009). Land grab or development opportunity? Agricultural investment and international land transactions in Africa. IIED, FAO and IFAD.

Cotula, L. and Vermeulen, S. (2011). Contexts and procedures for farmland acquisitions in Africa: what outcomes for local people. Development 54(1):40-48.

Deininger, K. (2011). Challenges posed by the new wave of farmland investment. The Journal of Peasant Studies 38 (2) 217-247.

Deininger, K. and Byerlee, D. (2011). Rising global interest in farmland: can it yield sustainable and equitable benefits? Washington, DC: World Bank.

D'Odorico, P., Laio, F., and Ridolfi, L. (2010). Does globalization of water reduce societal resilience to drought? Geophys. Res. Lett., 37, L13403

Donald, P. (2004). "Biodiversity impacts of some agricultural commodity production systems." Conservation Biology 18:17-37.

Fairley P (2011). Introduction: Next generation biofuels. Nature 474 (Issue 7352: S2-S5. doi: 10.1038/474S02a (accessed 28 June 2011)

FAO (2008). BIOFUELS: prospects, risks and opportunities. Food and Agriculture Organization, Rome, Italy. ftp://ftp.fao.org/docrep/fao/011/i0100e/i0100e.pdf (accessed 8 April 2011)

FAO. (2009). How to Feed the World in 2050. . Food and Agriculture Organization, Rome, Italy. http://www.fao.org/fileadmin/templates/wsfs/docs/expert_paper/How_to_Feed_the_World_in_2050.pdf (accessed 24 June 2011)

FAO. (2010). Global Forest Resources Assessment 2010. Key findings. Food and Agriculture Organization, Rome, Italy. http://foris.fao.org/static/data/fra2010/KeyFindings-en.pdf (accessed 20 May 2011)

FAO. (2011). FAO Food Price Index. http://www.fao.org/worldfoodsituation/wfs-home/foodpricesindex/en/ (accessed 9 June 2011)

Field, C.B., Campbell, J.E., and Lobell, D.B., 2007, "Biomass energy: the scale of the potential resource", Trends in Ecology and Evolution, 23, pp. 65-72.

Fitzherbert B, Struebig, M, Morel A, Danielsen F, Bruhl C, Donald P, and Phalan B (2008). How will oil palm expansion affect biodiversity? Trends in Ecology and Evolution Vol.23 (10): 538-545

IAASTD. (2009). Agriculture at a crossroads. Global Report. McIntyre B., Herren H., Wakhungu J, Watson R. (Editors). International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD). http://www.agassessment.org (accessed 20 June 2011)

IEA (2011). Technology Roadmap: Biofuels for Transport. International Energy Agency. http://www.iea.org/papers/2011/biofuels_roadmap.pdf (accessed 28 June 2011)

IIASA. (2009). Biofuels and food security. International Institute for Applied Systems Analysis (IIASA). http://www.ofid.org/publications/PDF/biofuels_book.pdf (accessed 25 April 2011)

IFPRI (2009). "Land grabbing" by foreign investors in developing countries: Risks and opportunities. International Food Policy Research Institute. http://www.ifpri.org/publication/land-grabbing-foreign-investors-developing-countries (accessed 20 June 2011)

IWMI (2007). Comprehensive Assessment of Water Management in Agriculture (CA) (2007). Water for Food, Water for Life: A comprehensive assessment of water management in agriculture. Earthscan, London and International Water Management Institute, Colombo: International Water Management Institute.

Koh, L. and Wilcove, D. (2008). "Is oil palm agriculture really destroying tropical biodiversity?" Conservation Letters 1(2):60-64.

LRAN. (2011). Global Land Grabs: Investments, risks and dangerous legacies. Development 54(1): 5-11. Land Research Action Network.

Melillo, J., Reilly, J., Kicklighter, D., Gurgel, A., Cronin, T., Paltsev, S., Felzer, B., Wang, X., Sokolov, A. and Schlosser C. 2009. Indirect Emissions from Biofuels: How Important? Science, 326(5958): 1397-1399.

Mendonça, M. (2011). Monocropping for agrofuels: The case of Brazil. Development 54(1):98-103.

OECD-FAO (2010). Agricultural Outlook 2010-2019. OECD, Food and Agriculture Organization of the United Nations. www.agri-outlook.org/dataoecd/13/13/45438527.pdf (accessed 20 June 2011)

OI (2011a). Understanding Land Investment Transactions in Africa. Country Report: Ethiopia. The Oakland Institute, California, USA. http://media.oaklandinstitute.org/sites/oaklandinstitute.org/files/OI_Ethiopa_Land_Investment_report.pdf (accessed June 20, 2011)

OI (2011b). Understanding Land Investment Transactions in Africa. Country Report: Mali. The Oakland Institute, California, USA. http://media.oaklandinstitute.org/understanding-land-investment-deals-africa-mali (accessed 20 June 2011)

Padgham J (2009). Agricultural Development Under a Changing Climate: Opportunities and Challenges for Adaptation. Joint Discusion Paper. The World Bank. http://siteresources.worldbank.org/INTARD/Resources/climate_change_combined.pdf (accessed 24 June 2011)

Rosset, P. (2011). Food sovereignty and alternative paradigms to confront land grabbing and the food and climate crises. Development 54(1):21-30.

Rost, S., Gerten, D., Hoff, H., Lucht, W., Falkenmark, M., Rockström, J. (2009). Global potential to increase crop production through water management in rainfed agriculture. Environmental Research Letters 4:1-9.

Sulle, E. and Nelson, F., (2009). Biofuels, land access and rural livelihoods in Tanzania, IIED, London.

Sutherland, J., Clout, M., Côté, M., and others (include all authors) (2010). A horizon scan of global conservation issues for 2010. Trends in Ecology and Evolution Vol.25(1): 1-7.

UNCTAD. (2009). World Investment Report 2009: Transnational Corporations, Agricultural Production and Development UN Conference on Trade and Development. http://www.unctad.org/en/docs/wir2009_en.pdf (accessed 19 May 2011)

UNPD. (2011). World Population Prospects, the 2010 Revision. United Nations Population Division.

Werf G.R., Morton D.C., DeFries R.S., Olivier J.G.J., Kasibhatla P.S., Jackson R.B., Collatz G.J. Randerson and J.T. (2009). "CO2 emissions from forest loss". Nature Geoscience 2 (11):737-738. doi:10.1038/ngeo671

Zhang X. and Cai X. (2011). Climate change impacts on global agricultural land availability. Environ. Res. Lett. 6 (2011) 014014 (8pp)

Zoomers A. (2011). Rushing for Land: Equitable and sustainable development in Africa, Asia and Latin America. Development 54(1):12-29.

Zoomers, A. (2010). Globalisation and the foreignisation of space: seven processes driving the current global land grab. Journal of Peasant Studies, 37(2): 429–447.
