

UC Berkeley

UC Berkeley Previously Published Works

Title

The land and its people

Permalink

<https://escholarship.org/uc/item/2dj1s5hq>

Journal

Nature Geoscience, 7(5)

ISSN

1752-0894

Authors

D'Odorico, Paolo
Rulli, Maria Cristina

Publication Date

2014-05-01

DOI

10.1038/ngeo2153

Peer reviewed

scientists, it is easy to discount the intransigence of ranchers to accept climate change findings through this lens; the cost of mitigating the climatic impact of the livestock industry — if borne by ranchers alone — would not be trivial.

Yet given that the salaries of the next generation of ranchers could depend on mitigating the effects of climate change, it is clearly in the interests of ranchers as well as climate scientists that the effects of climate change on grasslands and livestock production be more thoroughly explored. An expansion of the climate change research agenda to better represent forage quality and livestock performance will in turn raise the status of climate scientists with ranchers,

and increase the likelihood that ranchers reduce the environmental footprint of livestock production and adopt successful adaptation strategies. □

Joseph M. Craine is in the Division of Biology, Kansas State University, Manhattan, Kansas 66506, USA.
e-mail: jcraine@ksu.edu

References

- Ripple, W. J. *et al.* *Nature Clim. Change* **4**, 2–4 (2013).
- Steinfeld, H. *et al.* *Livestock's long shadow* (FAO, 2006).
- FAO *World Livestock 2011 — Livestock in food security* (FAO, 2011).
- Bouwman, L. *et al.* *Proc. Natl Acad. Sci. USA* **110**, 20882–20887 (2011).
- Gerber, P. J. *et al.* *Tackling climate change through livestock: A global assessment of emissions and mitigation opportunities* (FAO, 2013).
- Craine, J. M., Elmore, A. J., Olson, K. C. & Tolleson, D. *Glob. Change Biol.* **16**, 2901–2911 (2010).
- Van Soest, P. J. *Nutritional Ecology of the Ruminant* 2nd edn (Cornell Univ. Press, 1994).
- Wu, Z., Dijkstra, P., Koch, G. W. & Hungate, B. A. *Nature Clim. Change* **2**, 458–461 (2012).
- Cheng, X., Luo, Y., Xu, X., Sherry, R. & Zhang, Q. *Biogeosciences* **8**, 1487–1498 (2011).
- Ainsworth, E. A. & Long, S. P. *New Phytol.* **165**, 351–371 (2005).
- LeCain, D. R., Morgan, J. A., Hutchinson, G. L., Reeder, J. D. & Dijkstra, F. A. *Grass Forage Sci.* **67**, 350–360 (2012).
- Zavala, J. A., Nability, P. D. & DeLucia, E. H. *Annu. Rev. Entomol.* **58**, 79–97 (2013).
- Lunney, D. *et al.* in *Wildlife and Climate Change: Towards robust conservation strategies for Australian fauna* (eds Lunney, D. & Hutchings, P.) 150–168 (Royal Zoological Society of New South Wales, 2012).
- Murray, T. J., Ellsworth, D. S., Tissue, D. T. & Riegler, M. *Glob. Change Biol.* **19**, 1407–1416 (2013).
- McLauchlan, K. K., Ferguson, C. J., Wilson, I. E., Ocheltree, T. W. & Craine, J. M. *New Phytol.* **187**, 1135–1145 (2010).
- Craine, J. M. *PLoS ONE* **8**, e67065 (2013).
- Joyce, L. A. *et al.* *Rangeland Ecol. Manag.* **66**, 512–528 (2013).
- Polley, H. W. *et al.* *Rangeland Ecol. Manag.* **66**, 493–511 (2013).

The land and its people

Paolo D'Odorico and Maria Cristina Rulli

Large tracts of agricultural land are being bought up by external investors. Turning the land into a commodity can have detrimental effects, for generations to come, on the local communities that sell or lease the land.

Land is the ultimate foundation of a society's livelihood, identity and way of life. Many cultures and religions recognize soil as a source of life and prosperity, and have traditions tied to the land, its products and geographic location.

The fraction of land available for agriculture is likely to decline as land use intensifies¹. The land should therefore be managed with care. Local indigenous communities tend to make good stewards of the land, as they are directly affected by the benefits and environmental impacts of its management^{2–4}. Large-scale transnational acquisitions threaten to undermine the ethic of land stewardship by placing the land under the care of managers who make decisions from afar.

Here we argue that even when the original owners of the land make an informed decision to sell or lease the land, and when the land is paid for at market value, large-scale land acquisitions can greatly compromise the food security, economic stability and future livelihoods of local communities.

The global rush for land

Large-scale acquisitions of agricultural land by external investors, be they individuals, corporations or governments, have increased at an unprecedented rate over the last ten

years^{5,6}. This global rush for land was probably exacerbated by the food crisis of 2007 to 2008, when food prices skyrocketed in response to crop failures, new bioenergy policies and increasing demands for agricultural products by a growing and increasingly affluent global population^{7,8}. Corporations began to recognize the potential for high financial returns from agricultural land, and governments started to enhance their food security by purchasing large tracts of agricultural land in foreign countries^{6–8}.

So far, about 35.6 million hectares of cropland have been acquired by foreign investors worldwide⁵, more than twice the area of agricultural land in Germany. The top six target countries are Papua New Guinea, Indonesia, South Sudan, the Democratic Republic of Congo, Mozambique and Brazil. Together, these countries account for 45% of the land sold. The land is expected to be used primarily for agriculture and forestry, although mining, industry, conservation and tourism are also important drivers of these investments⁵. So far, only about 12% of the land acquired for agriculture has been cultivated⁵; in many cases the land remains unused, and simply serves as a development option for investors further down the line.

Local communities lose legal access to their land and its products as a result of these deals.

When the transactions take place without the consent of previous land users, or fail to take into account the environmental and societal impacts of the exchange, they are clearly in violation of human rights. Transactions of this kind are often referred to as 'land grabbing'⁹. Here, however, we highlight some of the more general implications of the commodification of land, and so focus on those acquisitions that do not constitute a land grab.

Capital gain and loss

The replacement of a community's natural capital with financial capital compromises the sustainability of that community. Even if the money generated by the sale of the land proves sufficient to sustain the previous land users and improve their quality of life, the situation would still only be considered 'weakly sustainable', as the sell-off of land generates economies that are more vulnerable to uncertainties in the global financial market¹⁰.

Some of the downsides of trading natural for financial capital are illustrated by the case of phosphate mining in Nauru¹⁰, an island in the Pacific Ocean known for its rich deposits of mineral phosphorous. Phosphorous deposits have been aggressively mined over the past few centuries¹¹ because of the important control exerted by this

nutrient on crop productivity. Mining of Nauru's phosphorus deposits commenced soon after their discovery in the early 1900s when the island was under German rule, and continued after the First World War when it passed under the control of Australia, New Zealand and Great Britain. By the time of independence in 1968, more than 34 million tons of phosphate had been extracted and exported from the island¹⁰. The environmental impacts of mining were disastrous: the top soil was lost, leaving a rocky substrate unsuitable for vegetation growth, and important native animal and plant species disappeared¹⁰ (Fig. 1). Although the exploitation of Nauru's phosphate reserves before its independence is just one of the many cases of 'grabbing' in colonial history¹¹, the decision to continue with the extraction and sale of phosphate after 1968 was an independent one. Nauruans kept mining the island and used the proceeds from the sale of phosphates to create a trust fund for the island's inhabitants. The income generated by the trust fund rendered the country richer than many other Pacific island states, and enabled them to buy food from abroad¹⁰.

However, at the turn of the century, revenues from the trust fund became insufficient to support the population of the island¹². As a result, the country was severely hit by the food crisis of 2007 to 2008¹³, when the food export bans issued by some governments drove up the cost of food considerably and staples became unaffordable¹⁴. Because of its remote location, dependence on food imports and lack of agricultural land, Nauru is particularly vulnerable to spikes in food prices, which can expose its population to poverty¹⁵.

The environmental and economic fallout from the sale of Nauru's natural capital illustrates the main problem with large-scale land acquisitions: whereas the land (if properly managed) remains a steady source of food and other land-based resources for the generations to come, financial capital is prone to inflation, uncertainty and risks. As such, the substitution of land for financial capital leads to an undesirable dependency on financial markets and food commodity imports, both of which are volatile, unpredictable and subject to failure. Furthermore, key exporters will soon have to reduce exports to meet the growing needs of their own burgeoning populations¹⁶. Reductions in global food exports are therefore becoming a real threat for import-dependent countries.

Traditional tenure and new norms

Traditional land tenure systems, such as the communal property regimes typical of many rural societies around the world, have impeded the sale of land in times of hardship¹⁷. In a communal land tenure, individuals or families have the right to use



© PHILIP GAME/ALAMY

Figure 1 | Nauru's legacy. The coral pillars represent the remains of Nauru's once-rich phosphate reserves. Intensive mining in the twentieth century, first under foreign rule and then following independence, stripped the country of its natural capital, and rendered the nation dependent on food imports and global market forces.

and access the land in accordance with a set of norms and regulations of resource governance based on seniority and their place in the community³, but have no individual property rights, and so are unable to sell the land. Communal tenure therefore spares the land from becoming a commodity. Unfortunately, such communal property regimes can totter and fall under the impetus of the ongoing land rush, as they did in northern Europe more than 200 years ago, when the commons were enclosed and privatized¹⁸.

The sale of large tracts of agricultural land to external parties not only compromises the safeguarding of that land for future generations, but also opens up local economies to the instability of global market forces. Because a free market economy is unable to advocate for the interests of those who have neither power nor a voice in global market dynamics — such as poor populations and future generations¹⁸ — new norms and institutions should be put in place to regulate the ongoing phenomenon of large-scale and long-distance land acquisitions.

There are no generic institutional solutions to the unwanted effects of foreign investments in agricultural land; partnerships that allow the local communities to retain property rights, work on the land and exercise local knowledge seem to be good alternatives. Such arrangements could allow the local communities to sustain land stewardship while maintaining — to some extent — land ownership⁸.

Paolo D'Odorico is at the University of Virginia, Department of Environmental Sciences, 291 McCormick Road, PO Box 400123, Charlottesville, Virginia 22904, USA.

Maria Cristina Rulli is at the Politecnico di Milano, Department of Civil and Environmental Engineering, Piazza L. Da Vinci, 32, I-20133, Milano, Italy. e-mail: paolo@virginia.edu; cristina.rulli@polimi.it

References

- Montgomery, D. *Dirt: The Erosion of Civilization* (Univ. California Press, 2008)
- Chapin, F. S. *et al. Trends Ecol. Evol.* **25**, 241–249 (2010).
- Ostrom, E. *Governing the Commons: The Evolution of Institutions for Collective Action* (Cambridge Univ. Press, 1990).
- Arnold, J. E. M. *Managing Forests and a Common Property* (Forestry Paper 136, FAO, 1998).
- The Land Matrix, Beta Version 2.0 (April 2013); <http://landmatrix.org> (accessed March 2014).
- Anseeuw, W. *et al. Transnational Land Deals for Agriculture in the Global South: Analytical Report based on the Land Matrix Database* (The Land Matrix Partnership, 2012).
- Cotula, L., Vermeulen, S., Leonard, R. & Keeley, J. *Land Grab or Development Opportunity? Agricultural Investment and International Land Transactions in Africa* (IIED, FAO and IFAD, 2009).
- Deininger, K. & Byerlee, D. *Rising global interest in farmland: Can it yield sustainable and equitable benefits?* (Report, World Bank, 2011).
- International Land Coalition Report of the ILC International Conference and Assembly of Members (2011).
- Gowdy, J. M. & McDaniel, C. N. *Land Econ.* **75**, 333–338 (1999).
- Skaggs, J. M. *The Great Guano Rush: Entrepreneurs and American Overseas Expansion* (St. Martin's Press, 1994).
- Asian Development Bank *Country economic report – Nauru* (2007).
- Pacific Islands Forum Secretariat *Major economic shocks and pacific island countries* (Forum Economic Ministers' meeting, 2012).
- Fader, M., Gerten, D., Krause, M., Lucht, W. & Cramer, W. *Env. Res. Lett.* **8**, 014046 (2013).
- <http://www.un.org/en/ga/63/generaldebate/nauru.shtml>
- Suweis, S., Rinaldo, A., Maritan, A. & D'Odorico, P. *Proc. Natl Acad. Sci. USA* **110**, 4230–4233 (2013).
- Deveroux, S. *Oxford Dev. Studies* **29**, 245–263 (2001).
- Ikerd, J. *J. Agricul. Food Syst. Commun. Dev.* **4**, 7–9 (2013).