LIVESTOCK EMERGENCY GUIDELINES AND STANDARDS (LEGS)

CLIMATE CHANGE BRIEFING PAPER

John Morton
Natural Resources Institute
University of Greenwich
j.f.morton@gre.ac.uk

May 2013

UNIVERSITY of GREENWICH | Natural Resources Institute

Introduction

The aim of this paper is to outline for the Steering Group of LEGS (Livestock Emergency Guidelines and Standards) the major issues at the intersection of climate change, small-scale livestock production and disaster risk reduction (DRR) in order to inform the forthcoming revision of the LEGS Handbook. In accordance with the Terms of Reference provided by Vetwork UK, this paper is divided into:

a) a summary of current knowledge, thinking and debates on climate change, disasters and drought, and;
b) detailed recommendations for possible amendments to LEGS [not included in this version]

A) Climate Change, Disasters, Drought and Livestock

Climate Change and the Frequency of Disasters

The most important categories of disasters that affect livestock-related livelihoods in developing countries are undoubtedly climate- or weather related. These include most notably droughts, which have been responsible for millions of livestock deaths, and hundreds of thousands of deaths among livestock-keepers in the last few decades – see for example Table 5.1 in the Fourth Assessment Report of the IPCC (Easterling *et al.* 2007:278). Weather-related disasters affecting livestock also include heavy rainfall events and floods which may also have serious implications for animal disease outbreaks (see Little 2001, Baylis and Githeko 2006), tropical storms in coastal areas, and various forms of extreme cold events.[1]

To say that disasters are weather- or climate-related is not the same as stating that they have increased or will increase, in frequency or severity. While there has been widespread discussion in development circles[2] and the media (for example, Thompson, 2009 in *Time* magazine) attributing current increases in drought to climate change, the scientific evidence is much less clear-cut. The IPCC Special Report of 2012 "Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation", generally referred to as SREX[3], presents judgements of confidence in the detection of recent long-term trends in drought and in projections of future trends. Table 1 summarises trends in "dryness", for selected regions.

Table 1 shows the rather limited confidence with which current patterns of drought in developing countries can be ascribed to climate change, with partial exceptions for West and Southern Africa. This low confidence is due to definitional issues, lack of data, and inconsistent or insufficient evidence. Given public discussion of drought and climate change in the Horn of Africa, this is a significant conclusion.

The table also shows the limited areas of the world for which there is medium confidence that drought will increase – Southern Africa and North-eastern Brazil.[4] This is confirmed in narrative text (Seneviratne *et al.* 2012:174-175) which specifically excludes the rest of Africa and South Asia from a list of regions where there is medium confidence in a projected future increase in duration and intensity of droughts. The low confidence springs from insufficient agreement of projections, depending both on climate models and drought indices. Where there is medium confidence the inability of models to include all relevant factors prevents this confidence being higher. SREX (Seneviratne *et al.* 2012:176) also reports studies finding no evidence for an observed increase in flooding in Africa.

[1] The best known examples of extreme cold events affecting livestock are the *dzud* of Mongolia, particularly the severe *dzud* of 1999-2002 and 2009-2010, which are themselves compounds of cold itself, deep snow levels, compaction of snow to form an ice-layer, and drought conditions over the previous summer. These have had catastrophic impacts on livestock, livelihoods and macro-economic performance, and there are complex arguments about whether they are linked to global climate change (Batima *et al.* 2008 a and b, Murray *et al.* 2012). Cold events have also had major impacts on livestock in Chile (the *terremoto blanco* or white earthquake of 1995 which killed 300,000 sheep, though English-language information is extremely scarce), and in Senegal (Ced Hesse, pers.comm.)

[2] For example, the report *Climate Frontline* (2009) by a consortium of NGOs, and briefings by Oxfam (2008) and CARE (nd)

[3] Individual chapters of SREX are referenced separately according to the standard citations on their title pages.

[4] Together with Southern Europe and the Mediterranean, Central Europe, Central North America, Central America and Mexico, not included in the adapted table here.

Table 1: Observed and Projected Trends in Dryness/Drought for Major Regions of the Developing World

Region	Observed trends	Future projection
Africa (All)	Medium confidence in overall increase in dryness	Low to medium confidence in increase in dryness
West Africa	Medium confidence in prolonged meteorogical droughts 1961-2000, with increased interannual variability and differentiation between drier western Sahel and wetter eastern Sahel in recent years	Low confidence in any regional trend
East Africa	Low confidence in any regional trend	Medium confidence in decreasing dryness
Southern Africa	Medium confidence in increase in dryness	Medium confidence in increasing dryness and increase in area of drought
NE Brazil	Low confidence in any regional trend	Medium confidence in increasing dryness
Central Asia	Low confidence in any regional trend	Low confidence in any regional trend
South Asia	Low confidence in any regional trend	Low confidence in any regional trend

Source: adapted from Seneviratne *et al*. 2012, Tables 3-2 and 3-3, pp.191-202, which cite multiple sources from the peer-reviewed literature. Observed trends are generally 1950-present. Future projections are for late 21st century compared to late 20th century, generally for the A2 or A1B emissions scenarios, and derived from multiple Global Climate Models. "Dryness" is defined through a number of indices, including Consecutive Dry Days, Palmer Drought Severity Index and (Simulated) Soil Moisture Anomalies. There is a considerable amount of technical explanation in the original tables and Box 3-3.

Some more recent studies not cited in SREX do somewhat modify this picture. Lyon and DeWitt (2012) see a "recent and abrupt decline in the East African long rains" since 1999. Lott *et al*. (2013) ask "Can the 2011 East African drought be attributed to human-induced climate change?" – remembering that this drought was particularly catastrophic. Using large numbers of simulations, they conclude that human action, working through effects on sea-surface temperatures, was found to increase the probability of failed long rains as in 2011 (though no evidence was found for human influence on the failed 2010 short rains).

The detection and attribution of recent and past trends in extreme weather events, and future projections, are both complex sciences which are evolving rapidly. For detection and attribution, there are important methodological issues around collecting and analysing local perceptions of changing climate and triangulating them with climate science (see Magrath and Jennings 2012). If post-SREX science continues to increase our confidence in attributing observed drought to climate change, agencies involved in Disaster Risk Reduction (DRR) in livestock-dependent communities have a duty to incorporate the best available science in their preparedness work. However, at present, climate science gives few *specific* pointers, above and beyond what is already known to the DRR community, for how to improve either drought preparedness or the conduct of drought-time interventions.

There is an additional point: agencies involved in DRR also have a duty not to overstate the science of climate change in their communications with donors, the media and the public, for fear of encouraging a backlash against ideas of climate change. As Richard Betts of the UK Met Office has written "The focus on climate change is now so huge that everybody seems to need to have some

link to climate change if they are to attract attention and funding. Hence the increasing tendency to link everything to climate change - whether scientifically proven or not…. Talking up of the problem then gives easy ammunition to those who wish to discredit the science" (Betts, 2010).

Disaster Risk Reduction and Preparedness

As a broad generalisation, the flow of ideas on vulnerability and adaptation has to date been from the DRR community towards the climate change adaptation community. Very few of the points in the Executive Summary of Chapter 5 of SREX: "Managing the Risks from Climate Extremes at the Local Level" would be particularly novel to DRR practitioners such as the LEGS authors and readership. These include: the importance of local and national context, inequality and access to resources in determining how the impact of disasters is experienced; the importance of communication, participation and integration of local knowledge in managing disaster risk; and the importance of using recovery to increase resilience, and of mainstreaming DRR in development policies. More generally, the climate change literature is full of examples of socio-economic vulnerability to drought being used as an analogue for vulnerability to climate change, and adaptation to drought for adaptation to climate change. Put broadly, in the absence of more detailed projections on what types of disaster will become more frequent, where, and when, it is not clear how much the climate literature has to offer to DRR.

Nevertheless, two of the points about preparedness in SREX Chapter 5 are significant for DRR practitioners. SREX makes important points about the importance of local institutions *and learning* as a basis for risk management and adaptation: "Local-level institutions and self-organization are critical for social learning, innovations, and action; all are essential elements for local risk management and adaptation (Cutter *et al.* 2012:294). This triple linkage between disaster (or climate) preparedness, participation and social learning is underlined elsewhere in the chapter (Cutter et al. 2012: 322-324 including Box 5-7 and Figure 5-2).

SREX Chapter 5 also supports the use of insurance, including innovative insurance mechanisms, for risk transfer. This is made more relevant by the unfolding example of index-based livestock insurance in Kenya (ILRI 2012, Carter and Janzen 2012).[5]

Climate change literature therefore helps to reinforce the need for debates within the DRR community (and the part of that community concerned with livestock) on how specific disaster interventions can incorporate participation, can be used for social learning, and how the results of that learning and the knowledge they generate can be used in policies that stretch over the drought cycle and up to the national level of policy. Some of the DRR and adaptation measures relevant to livestock and mentioned in Chapter 6 of SREX (Lal *et al*. 2012) are relevant here: livestock diversification, research on climate tolerant livestock, insurance. Early Warning Systems are also relevant.

[5] Insurance issues are mentioned in the Introduction to LEGS, but not otherwise covered.

Climate Change and the Public Face of Livestock Development

One final point on climate change concerns the increased concern in the media and elsewhere about the responsibility of the global livestock sector for GHG emissions, especially since the 2009 publication of *Livestock's Long Shadow*, and its much repeated figures of the livestock sector producing 18% of global anthropogenic GHG emissions and 37% of global anthropogenic methane emissions.[6] I am *not* recommending that discussions of livestock-related DRR need address or debate these views in detail, but the creeping critical attitude to the whole livestock sector, including in the minds of the general public funding Northern NGOs, requires reaffirmation at strategic intervals of the dependence of many poor people on livestock, the rationality and sustainability of those livelihoods, and the complete unlikelihood in the short or medium-term of wholesale transfer away from livestock-linked livelihoods that are themselves either sustainable or dignified.[7]

[6] Also relevant are the public statement of Dr Pachauri, Chair of the IPCC, on the climate benefits of eating less meat (Black 2008), and from the point of view of nitrogen emissions (nitrous oxide being another potent greenhouse gas and other nitrogen compounds having a range of environmental impacts) Davidson (2012), the UNEP Report *Our Nutrient World*, and news coverage of the latter (http://www.guardian.co.uk/environment/2013/feb/18/halve-meat-consumption-scientists)

[7] These views are well set out in other FAO documents, such *The State of Food and Agriculture: Livestock in the Balance* (2009)

REFERENCES

Batima, P., L. Natsagdorj. and N. Batnasan (2008a) Vulnerability of Mongolia's pastoralists to climate extremes and changes. In *Climate Change and Vulnerability,* N. Leary, C. Conde, J. Kulkarni, A. Nyong and J. Pulhin (eds.), Earthscan, London/Sterling Va, 66-87.

Batima, P., B. Bold, T. Sainkhuu, and B. Bavuu (2008b) Adapting to drought, zud and climate change in Mongolia's rangelands. In *Climate Change and Adaptation,* N. Leary, J. Adewojun, V. Barros, I. Burton, J. Kulkarni and R. Lasco (eds.), Earthscan, London/Sterling Va., 197-210.

Baylis, M. and A. Githeko (2006) The effects of climate change on infectious diseases of animals. Report T7.3, Foresight Project on Infectious Diseases: Preparing for the Future, UK Government Foresight Office, London http://www.bis.gov.uk/assets/foresight/docs/infectious-diseases/t7_3.pdf

Betts, R. (2010) "Science must end climate confusion". *Viewpoint* on BBC website http://news.bbc.co.uk/1/hi/8451756.stm

Black, R (2008) "Shun meat, says UN climate chief", BBC website, http://news.bbc.co.uk/1/hi/7600005.stm

CARE (nd) *Adaptation Learning Programme for Africa* http://www.careclimatechange.org/files/adaptation/ALP.pdf

Carter, M. and S. Janzen (2012) Coping with drought: assessing the impacts of livestock insurance in Kenya. *Index Insurance Innovation Initiative Brief 2012–1*. http://www.basis.ucdavis.edu/i4/publications/files/I42012-CopingWithDrought.pdf

Concern Universal, FARM-Africa, Find Your Feet, Self-Help Africa and Utviklinsfondet/The Development Fund (2009) *Climate Frontline: African Communities Adapting to Survive*, Oslo, The Development Foundation.

Cutter, S., B. Osman-Elasha, J. Campbell, S.-M. Cheong, S. McCormick, R. Pulwarty, S. Supratid, and G. Ziervogel, 2012: Managing the risks from climate extremes at the local level. . In: *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation: A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change (IPCC)*, C.B. Field, V. Barros, T.F. Stocker, D. Qin, D.J. Dokken, K.L. Ebi, M.D. Mastrandrea, K.J. Mach, G.-K. Plattner, S.K. Allen, M. Tignor, and P.M. Midgley (eds.), Cambridge University Press, Cambridge and New York, 291-338.

Davidson, E.A. (2012) Representative concentration pathways and mitigation scenarios for nitrous oxide. *Environmental Research Letters* 7(2):1-7.

Easterling, W.E., P.K. Aggarwal, P. Batima, K.M. Brander, L. Erda, S.M. Howden, A. Kirilenko, J. Morton, J.-F. Soussana, J. Schmidhuber and F.N. Tubiello, (2007) Food, fibre and forest products. In *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, (eds.), Cambridge University Press, Cambridge, 273-313.

FAO (2009) *The State of Food and Agriculture: Livestock in the Balance*.

Harvey, F (2013) "Halve meat consumption, scientists urge rich world", Guardian website http://www.guardian.co.uk/environment/2013/feb/18/halve-meat-consumption-scientists

ILRI (International Livestock Research Institute) (2012) *Project summary: index-based livestock insurance for northern Kenya's arid and semi-arid lands: the Marsabit pilot.* ILRI, Nairobi. http://cgspace.cgiar.org/bitstream/handle/10568/494/IBLI_PROJECT_SUMMARY_0110.pdf?sequence=1

Lal, P.N., T. Mitchell, P. Aldunce, H. Auld, R. Mechler, A. Miyan, L.E. Romano, and S. Zakaria (2012) National systems for managing the risks from climate extremes and disasters. In: *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation: A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change (IPCC)*, C.B. Field, V. Barros, T.F. Stocker, D. Qin, D.J. Dokken, K.L. Ebi, M.D. Mastrandrea, K.J. Mach,

G.-K. Plattner, S.K. Allen, M. Tignor, and P.M. Midgley (eds.), Cambridge University Press, Cambridge and New York, 339-392.

Little, P.D., H. Mahmoud and D.L. Coppock (2001) When deserts flood: risk management and climatic processes among East African pastoralists. *Climate Research* 19(1):149-159.

Lott, F.C., N. Christidis and P.A.Stott (2013) Can the 2011 East African drought be attributed to human-induced climate change? *Geophysical Research Letters* 40(6):1117-1181.

Lyon, B. and D.G. Dewitt (2012): A recent and abrupt decline in the East African long rains. *Geophysical Research Letters* 39(2).

Magrath, J. and S. Jennings (2012) What happened to the seasons? Farmers' perceptions and meteorological observations of changing seasonality. In *Seasonality, Rural Livelihoods and Development*, S. Devereux, R. Sabates-Wheeler and R. Longhurst (eds.), Earthscan, London and New York, 25-38.

Murray, V., G. McBean, M. Bhatt, S. Borsch, T.S. Cheong, W.F. Erian, S. Llosa, F. Nadim, M. Nunez, R. Oyun, and A.G. Suarez (2012) Case studies. In: *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation: A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change (IPCC)* C.B. Field, V. Barros, T.F. Stocker, D. Qin, D.J. Dokken, K.L. Ebi, M.D. Mastrandrea, K.J. Mach, G.-K. Plattner, S.K. Allen, M. Tignor, and P.M. Midgley (eds.), Cambridge University Press, Cambridge and New York, 487-542.

Oxfam (2008) *Survival of the fittest: Pastoralism and climate change in East Africa*, Oxfam Briefing Paper http://www.oxfam.org/sites/www.oxfam.org/files/bp116-pastoralism-climate-change-eafrica-0808.pdf

Seneviratne, S.I., N. Nicholls, D. Easterling, C.M. Goodess, S. Kanae, J. Kossin, Y. Luo, J. Marengo, K. McInnes, M. Rahimi, M. Reichstein, A. Sorteberg, C. Vera, and X. Zhang (2012) Changes in climate extremes and their impacts on the natural physical environment. In: *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation: A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change (IPCC)*, C.B. Field, V. Barros, T.F. Stocker, D. Qin, D.J. Dokken, K.L. Ebi, M.D. Mastrandrea, K.J. Mach, G.-K. Plattner, S.K. Allen, M. Tignor, and P.M. Midgley (eds.), Cambridge University Press, Cambridge and New York, 109-23.

Sutton, M.A, A. Bleeker, C.M. Howard, M. Bekunda, B. Grizzetti, W. de Vries, H.J.M. van Grinsven, Y.P. Abrol, T.K. Adhya, G. Billen, E.A. Davidson, A. Datta, R. Diaz, J.W. Erisman, X.J. Liu, O. Oenema, C. Palm, N. Raghuram, S. Reis, R.W. Scholz, T. Sims, H. Westhoek & F.S. Zhang (2012) *Our Nutrient World: The challenge to produce more food and energy with less pollution*. UNEP, Nairobi.

Thompson, C. (2009) "Floods and droughts: how climate change is impacting Africa", Time Magazine http://www.time.com/time/specials/packages/article/0,28804,1929071_1929070_1936772,00.html