



bio watch
SOUTH AFRICA

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Fact Sheet: Drought crisis



PHOTO: VANESSA BLACK

Drought-stricken Tshaneni, KwaZulu-Natal, overlooking the Jozini Dam.

Thirst, hunger and anguish as livestock perish and crops fail

Communities across Southern Africa are experiencing a bitter season of thirst, hunger and anguish as livestock perish and crops fail. The impacts of the driest year since 1904 (when rainfall was measured first in South Africa) are likely to be far-reaching.

The South African government has responded by allocating R1-billion in the 2016 budget to drought relief measures, including the distribution of animal feed, moving cattle herds, transporting potable water and drilling boreholes.¹ While these measures will save lives now, many farmers will still be unable to carry the losses, and relief is unlikely to reach most of the two-and-a-half million small-holders whose livelihoods depend on farming.²

Local maize prices hit record highs in January 2016,³ and GRAIN SA expects at least five million tonnes of maize will be imported in 2016, at a cost of nearly R20-billion.⁴ Research by the Pietermaritzburg Agency for Community Social Action (PACSA), shows that low income households already spend half of their income on food, but

that this is not providing adequate nutrition.⁵ In October 2015 the cost of a basic food basket was already 14% more than the average household's monthly income. Due to the drought, the National Agricultural Marketing Council predicts that a basic food basket will cost 25% more,⁶ with dire consequences for food security.

The desperate situation has focused attention on relief measures, but there has been little public discussion about the factors contributing to the drought's severity and what we could do to lessen our vulnerability.

High global temperatures exacerbate drought – 2015 hottest year on record

Drought cycles in Southern Africa coincide with the El Niño – a naturally occurring warming of the eastern Pacific Ocean due to changing wind patterns. However, this year's drought has been exacerbated by high global temperatures largely resulting from human induced climate change. NASA has confirmed⁷ that 2015 was the hottest year on record, with the Earth's surface temperature rising one degree Celsius higher since 1880 when record-keeping began in the pre-industrial era.

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The elephant in the drought crisis room: industrial agriculture

The industrial food system is the biggest source of the greenhouse gas emissions that cause climate change, accounting for half of global emissions when the impacts of converting land to agriculture, on-farm production, distribution and waste are counted.⁸ Industrial farming (including mechanised tilling, and petro-chemical fertilisers and pesticides) kills soil life, thereby releasing carbon and destroying the fertility and water-holding capacity of the soil. High yielding hybrid crops are also heavy users of fertiliser and require irrigation. In South Africa, highly inefficient agricultural irrigation uses as much as 60% of fresh water resources.⁹

Northern KwaZulu-Natal, where Biowatch works with small-holder farmers, has experienced severe drought since 2014, prompting the KZN Cabinet to declare some districts as emergency disaster areas in January 2016.¹⁰ The water levels of dams in the area have fallen dramatically. By March 2016 the Jozini Dam had dropped to only 47% full – compared to 61% full at the same time in 2015 – and the Hluhluwe Dam had dropped to only 18%.¹¹ Half of the total water available in these catchments is used for irrigation, and an amount equivalent to half of irrigation use is lost in stream flow reductions.¹²

Small-holder farming communities, long ago displaced from the fertile flood plains by commercial agriculture, now look down on the lime green of irrigated cane while their own taps are dry. Senekal Boerdery, the largest single private sugarcane farm in the world is located upstream of the Jozini Dam.¹³ They irrigate 4 000 of the 24 800 hectares they have under cane,¹⁴ and are permitted to draw 32.6 million litres from the Jozini Dam per annum.¹⁵

Northern KZN has also seen a large increase in the area under industrial timber plantations. Eucalyptus trees can use 15-90 litres of water per tree per day,¹⁶ and pines 70% of that.¹⁷ On average each alien plantation tree needs as much water as the free basic water allocation per person; and there are at least 20 times as many plantation trees than people in South Africa.¹⁸

Tree plantations need to be in areas with high rainfall, which are often the catchments of South Africa's rivers and dams. According to the Department of Water Affairs and Forestry, plantations are concentrated in the 10% of South Africa that produces 60% of the country's water resources.¹⁹ Studies in Mpumalanga show that tree plantations reduce dry season stream flows in the province by 10% for total flows and by 18% in dry season low flows, but in some catchments low flow reduction was as much as 37%.²⁰ This can be devastating for downstream communities who rely on this water for their survival.

Despite evidence of harm, and the climate and water challenges the country faces, government is continuing to promote industrial agriculture and plantations. Small-holder farmers are being coerced into agricultural "massification" projects that require mechanisation,

agrichemical inputs and patented GM seeds that they can't afford. KwaZulu-Natal MEC for Agriculture and Rural Development Cyril Xaba's vision for agriculture focuses on developing commodity markets, thereby adding the business dimension to its massification and mechanisation programmes. For example, in February 2016 the KZN Department of Agriculture and Rural Development launched a project to distribute fertiliser and seed cane to 2 367 small growers and 21 co-operatives in the Ugu district on the south coast. The iniquitous investment in industrial agriculture is highlighted when one compares the R18-million investment in this one project,²¹ with only R19-million allocated to drilling new boreholes across the entire KZN province during the height of the drought in November 2015.²²

The MEC also intends to expand timber plantations as a vehicle for rural development. He is reported as saying that 40 000 hectares in planned timber expansion will be undertaken by small-scale growers on communal land,²³ while the timber industry in the Richards Bay area will produce wood pellets to supply European "renewable energy" needs.²⁴ It is shocking that these plans – which destroy our soils and export critical water reserves as wood pellets for climate-conscious Europeans to burn – are called "development".

GMOs will not protect farmers against drought

Instead of taking responsibility for their role in creating the problem, agribusiness interests are capitalising on the current drought to promote the use of genetically modified (GM) crops, which they claim will protect farmers against drought,²⁵ while reducing the use of pesticides.²⁶ Agriculture Minister Senzeni Zokwana has encouraged farmers to adopt GM crops, and is quoted saying that the National Agriculture and Technology departments are working to "develop GM seeds that are 20% resistant to drought".²⁷ Biowatch believes that this is disingenuous biotech spin for corporate profit.

Despite the hype, genetically modified crops with improved agronomic performance or improved nutrition are still pipe dreams.

Only two main trait types are found in commercialised GM crops – "herbicide tolerance", where crops sprayed with herbicides survive (but weeds and other leafy plants die), and "Bt" crops, modified to produce a pesticide in the plant. These traits involve manipulating a few genes that do not significantly affect the plant's physiology or metabolism. A plant's response to environmental conditions involves complex processes that result from the interactive expression of many different genes working together. This response not only affects plant growth and functioning, but may differ depending on the stage of the plant's growth and the severity of the stress.

It is difficult to engineer plant genes to respond to all these factors, and even more complex to assess the potential risks of these GMOs.²⁸ For example, the same genes that help a plant to tolerate drought

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stress may also limit growth. Most of the genetically modified crops held up as success stories are varieties that already have good agronomic performance developed through conventional breeding. The drought tolerance of many of these varieties originates from seed patiently selected over centuries by small-holder farmers adapting crops to grow in their own local conditions.

A biotech corporation can claim ownership of this heritage by inserting their simple GM traits into the seed and patenting the “new” crop variety. To date, only one so-called drought tolerant crop has been commercialised in the USA: Monsanto’s MON87460 DroughtGard maize containing the *cspB* gene. Even the pro-GM US Department of Agriculture (USDA) noted that DroughtGard is unlikely to be more effective than conventionally bred varieties, which have improved the drought tolerance of maize at a rate of 1% a year.²⁹

Promises and false claims

Monsanto, in collaboration with US philanthropy partners, is using the promise of drought tolerant crops to persuade recalcitrant African governments to open their borders to GM crops. The Water Efficient Maize for Africa (WEMA) project is targeting small-holder farmers in Kenya, Mozambique, Tanzania, Uganda and South Africa. To bolster the idea that WEMA is serving the interests of African farmers, Monsanto has “donated” its drought tolerant MON87460 and Bt MON810 genes to the project. Both of these are questionable “gifts” to bestow on small-holders. Following a series of controversial field trials under the auspices of WEMA, Monsanto applied for the full environmental release of MON87460 in South Africa in 2014. WEMA has field-trialled the insect resistant MON810 maize in Kenya. This maize was commercialised in South Africa in 1998 and withdrawn 13 years later when targeted pests became immune to the toxin.³⁰

The undue influence of US philanthropy in African decision-making on these issues was exposed in January 2016 when Bill Gates made an announcement at the World Economic Forum meeting in Davos that Kenya had approved the commercial growing of MON810 Bt maize despite vehement local opposition to the project and a moratorium on GM crops being in place in Kenya.³¹

Many other claims for GM crops are equally false; they have not reduced the use of toxic chemicals or increased yields. For example, independent research in the USA, where GM crops have been grown the longest (in a context of high access to inputs and subsidisation) found that GM maize crops had only increased yields by 3-4% in the first 13 years of commercial production. This equates to only a 0.3% yield increase per year compared to increases of 1% per year in conventionally bred maize over the same period. There was no increase in GM soya bean yields.³² Another found that in the first 16 years that GM crops were grown in the USA, overall pesticide use increased by 183 million kg, 7% more than for non-GM crops.³³

Agroecology – the real solution

Biowatch believes that the false solutions offered by industrial agriculture obscure the real causes of the drought, and undermine more effective strategies to lessen our vulnerability. Imagine if the billions of Rands that will be spent on drought relief and food imports could instead have been spent on appropriate and maintainable technologies powered with renewable energy, and on supporting rural communities to build capacity in locally-adapted agroecological farming, which builds water conservation into its practice.

Agroecology is a multi-faceted approach that applies ecological principles to farming methods that build on traditional knowledge and links producers to consumers in sustainable local food systems that enable food sovereignty and dignity in communities.

(See Biowatch Fact Sheet: Agroecology.)

Agroecology is not an unattainable dream – it just requires a different approach. In 2003 Brazil implemented a zero hunger programme with several inter-linked components. The National School Feeding Programme provides free school lunches to 47 million children daily. Thirty percent of this food must be bought from small-holder farmers who are paid 30% more for organic produce.³⁴ This has not only stimulated the market for agroecological produce, but also assists farmers to meet the demand with substantially increased state extension services. Agroecology has been adopted as the guiding approach for Technical Assistance and Rural Extension initiatives in Brazil.³⁵

The farmers Biowatch works with in northern KZN use a variety of methods to conserve water and build soil fertility. Swales channel runoff into their gardens and the farmers clean greywater for watering. Organic waste and animal manures are made into compost, which is incorporated into deep trench and double-dig planting beds, and the soil is covered with a thick layer of mulch. This improves the fertility and texture of the soil so that moisture is held for longer and the crops can withstand disease and pests without chemicals. The farmers are also in the process of reviving traditional grain and legume crops that are locally adapted and resilient to dry conditions. Every household has a seed bank and farmers are building their seed diversity through cultural events and ceremonies where seeds are exchanged. These types of organic agricultural systems emit 48-60% less carbon dioxide than industrial farming systems, and increased organic matter improves soil water retention by 20-40%.³⁶

These agroecology farmers have harvested crops while surrounding areas withered with the drought – proof positive that agroecology is one of the key ways in which we can counter the harmful effects of industrial agriculture on climate change, and mitigate the negative impacts of climate change on agriculture in a sustainable way.

“Agroecology farmers harvested crops while surrounding areas withered with the drought.”

References

1. South African National Treasury. 2016 Budget review: Consolidated spending plans. Available: <http://www.treasury.gov.za/documents/national%20budget/2016/review/chapter%205.pdf> [accessed 6 March 2016]
2. Statistics South Africa. 2013. Census 2011: Agricultural households. Pretoria.
3. Stoddard, E. 18 January 2016. UN food agency says 14 million face hunger in Southern Africa. *Reuters*. Available: <http://www.reuters.com/article/us-africadrought-wfp-idUSKCN0UW1AM> [accessed 21 January 2016]
4. Ngoepe, K. 15 January 2016. At least R20bn will be needed to import maize – Grain SA. *News 24*. Available: <http://www.news24.com/SouthAfrica/News/at-leastr20bn-will-be-needed-to-import-maize-grain-sa-20160115> [accessed 24 January 2016]
5. Smith, J and Abrahams, M. October 2015. *2015 PACSA food price barometer annual report*. Pietermaritzburg: PACSA. Available: http://www.pacsa.org.za/images/2015_PACSA_food_price_barometer_Low_Res.pdf [accessed 27 January 2016]
6. Ngoepe, K. 15 January 2016. At least R20bn will be needed to import maize – Grain SA. *News 24*. Available: <http://www.news24.com/SouthAfrica/News/at-leastr20bn-will-be-needed-to-import-maize-grain-sa-20160115> [accessed 24 January 2016]
7. NASA. 20 January 2016. *NASA, NOAA Analyses Reveal Record-Shattering Global Warm Temperatures in 2015*. Available: <http://www.nasa.gov/press-release/nasanoaa-analyses-reveal-record-shattering-global-warm-temperatures-in-2015> [accessed 27 January 2016]
8. GRAIN. September 2011. Food and climate change: the forgotten link. *Against the Grain*. Available: <http://www.grain.org/article/entries/4357-food-and-climatechange-the-forgotten-link> [accessed 27 January 2016]
9. South African Department of Water Affairs (DWA): Directorate: Water Services Planning & Information. 2013. *Strategic overview of the water sector in South Africa*. Available: <http://nepadwatercoe.org/wp-content/uploads/Strategic-Overview-of-the-Water-Sector-in-South-Africa-2013.pdf> [accessed 24 January 2016]
10. ANA Reporter. 8 January 2016. Drought: North KZN a disaster area. *IOI*. Available: <http://www.ioi.co.za/news/south-africa/kwazulu-natal/drought-northkzn-a-disaster-area-1968408> [accessed 4 March 2016]
11. See <https://www.dwa.gov.za/hydrology/weekly/ProvinceWeekaspx?region=KN> [accessed 4 March 2016]
12. Zululand District Municipality. October 2004. *Water Services Development Plan: Section 5 – Water Resource Profile*. Available: http://www.zululand.org.za/media/2026/DC26_WSDP_Section_5_Water_resource_V01_107.pdf [accessed 4 March 2016]
13. Armitage, I. 2012. Top of the Crops. Senekal Feature. *South Africa Magazine*. Available: <https://issuu.com/tnt-multimedia/docs/sa-mag-23-senekal-feature> [accessed 4 March 2016]
14. Bentley, L. 2013. Sweet deal for sugarcane farmer. *AgriEco*. Available: <http://www.agrieco.net/article.aspx?id=344> [accessed 4 March 2016]
15. Bruce Lankford, et al. 2011. Hydrological modelling of water allocation, ecosystem services and poverty alleviation in the Pongola floodplain, South Africa. *Journal of Environmental Planning and Management*, 54(9):1237-1260 Available: <http://dx.doi.org/10.1080/09640568.2011.567127> [accessed 4 March 2016]
16. Albaugh, J.M., Dye, P.J., & King, J.S. 2013. Eucalyptus and Water Use in South Africa. *International Journal of Forestry Research*. Article ID 852540, 11 pages, 2013. doi:10.1155/2013/852540
17. SAPPI. 2012. *Frequently asked questions about eucalyptus trees*. Available: <http://www.typek.co.za/typek/applications/typek/templates/downloads/Eucalyptus.pdf> [accessed 26 January 2016]
18. Adapted from Greef, L. 2010. *Thirsty tree plantations, no water left and climate confusion: What version of Sustainable Development are we leaving our children?* Ecodoc Africa.
19. Department of Waters Affairs and Forestry. n.d. Foresters: understanding what you pay for. Available: <https://www.dwa.gov.za/Projects/WARMS/docs/pdf/leafletforest.pdf> [accessed 26 January 2016]
20. Greef, L. 2010. *Thirsty tree plantations, no water left and climate confusion: What version of Sustainable Development are we leaving our children?* Ecodoc Africa.
21. South African Government. 4 March 2016. MEC Cyril Xaba: Launch of Sugar Cane Project. Available: <http://www.gov.za/speeches/launch-r14-million-sugarcane-project-3-mar-2016-0000> [accessed 4 March]
22. See KZN Department of Agriculture. November 2015. *2015/15 Draft drought intervention*. Available: http://www.gov.za/sites/www.gov.za/files/gcis_documents/kzn-drought-relief-scheme.pdf [accessed 4 March 2016]
23. Dawood, Z. 28 January 2015. New vision for KZN Agriculture. *IOI*. <http://www.ioi.co.za/news/south-africa/kwazulu-natal/new-vision-for-kznagriculture-1.1810329> [accessed 26 January 2016]
24. Asmal, F. 21 May 2015. KZN Agriculture to return profits. *Mail & Guardian*. <http://mg.co.za/article/2015-05-21-kzn-agriculture-to-return-profits> [accessed 8 February 2016]
25. Whittles, G. 26 August 2015. SA Farmers to use more GM crops? *Eye Witness News*. Available: <http://business.iafrica.com/news/1003856.html> [accessed 26 January 2016]
26. Dzirutwe, M. 7 January 2016. Africa takes fresh look at GMO crops as drought blights continent. *Reuters* and then reported on the SABC. Available: <http://www.reuters.com/article/us-africa-gmo-idUSKBN0UL1UN20160107> [accessed 26 January 2016]
27. Whittles, G. 26 August 2015. SA Farmers to use more GM crops? *Eye Witness News*. Available: <http://business.iafrica.com/news/1003856.html> [accessed 26 January 2016]
28. Wilkinson, M & Tepfer, M. 2009. Fitness and beyond: Preparing for the arrival of GM crops with ecologically important novel characters. *Environmental Biosafety Research* 8: 1-14.
29. Gurian-Sherman, D. 2012. *High and Dry: Why Genetic Engineering Is Not Solving Agriculture's Drought Problem in a Thirsty World*. Union of Concerned Scientists. Available: http://www.ucsusa.org/sites/default/files/legacy/assets/documents/food_and_agriculture/high-and-dry-report.pdf [accessed 25 January 2016]
30. African Centre for Biodiversity. 2015. *Profiting from the climate crisis, undermining resilience in Africa: Gate's and Monsanto's Water Efficient Maize for Africa (WEMA) project*. Available: http://acbio.org.za/wp-content/uploads/2015/05/WEMA_report_may2015.pdf [accessed 25 January 2016]
31. Mbaria, J. 2016. Philanthropists shouldn't shape our national agenda. *Daily Nation*. Available: <http://www.nation.co.ke/oped/Opinion/bill-Gates-Philanthropist/-/440808/3058180/-/l99wo1/-/index.html> [accessed 13 March 2016]
32. Gurian-Sherman, D. 2009. *Failure to yield: Evaluating the performance of genetically engineered crops*. Cambridge, MA: Union of Concerned Scientists. Available at: http://www.ucsusa.org/assets/documents/food_and_agriculture/failure-to-yeild.pdf. [accessed 25 January 2016]
33. Benbrook, C. 2012. Impacts of genetically engineered crops on pesticide use in the US – The first sixteen years. *Environ Sci Eur*. 2012(24). DOI:10.1186/2190-4715-24-24.
34. Kilpatrick, K. 2010. *Fighting Hunger in Brazil*. Oxfam Case Study. Oxford: Oxfam International. <https://www.oxfam.org/sites/www.oxfam.org/files/cs-fighting-hunger-brazil-090611-en.pdf> [accessed 15 April 2016]
35. Peterson, P., Mussoi, E.M. & Dal Soglio, F. 2013. Institutionalization of the Agroecological Approach in Brazil: Advances and Challenges. *Agroecology and Sustainable Food Systems*, 37(1):103-114. London: Taylor & Francis. Available: http://www.agriculturesnetwork.org/library/253798/at_download/libraryitem_file [accessed 15 March 2016]
36. Food and Agriculture Organization (FAO). 2007. *Report of the International Conference on Organic Agriculture and Food Security*, Rome, May 2007. Available: <http://www.fao.org/3/a-j9918e.pdf> [accessed 26 January 2016]
37. McIntyre, B.D., et al. Eds. 2009. *Agriculture at a crossroads: International Assessment of Agricultural Knowledge, Science and Technology for Development (Synthesis Report)*. Washington, DC: Island Press. Available: [http://www.unep.org/dewa/agassessment/reports/IAASTD/EN/Agriculture%20at%20a%20Crossroads_Synthesis%20Report%20\(English\).pdf](http://www.unep.org/dewa/agassessment/reports/IAASTD/EN/Agriculture%20at%20a%20Crossroads_Synthesis%20Report%20(English).pdf) [accessed 13 January 2016]



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