Agriculture

Annexure

Alize le Roux and Jakkie Cilliers

Last updated 08 October 2023 using IFs 7.84

Annexure

This theme used IFs version 7.84. All interventions start in 2024, interpolate to 2033 and then are maintained at that level unless indicated otherwise.

Interventions and parameters	Adjustment in IFs	Benchmark/justification/notes
Increase crop yields (ylm)	to 1.6 by 2033 for Niger and Cameroon to 1.5 by 2033 for Central African Republic, DR Congo, Lesotho, Mozambique, São Tomé and Príncipe, Senegal, Zimbabwe, Angola, Benin, Kenya, Madagascar, Nigeria, Cote d'Ivoire and Gabon to 1.4 by 2033 for Burkina Faso, Tanzania, Uganda, Ethiopia, Mali and Zambia to 1.3 by 2033 for Burundi, Chad, Gambia, Guinea, Liberia, Mauritania, Togo, Algeria, Congo, Sierra Leone, Equatorial Guinea and Tunisia to 1.25 by 2033 for South Sudan to 1.2 by 2033 for Botswana, Guinea Bissau, Sudan, Ghana, Morocco, Malawi and Somalia to 1.15 by 2033 for Djibouti, Libya, Seychelles, Comoros, Cabo Verde, Namibia and Rwanda to 1.1 by 2033 for Eritrea and South Africa	Brazil doubled yields from 5.2 metric tons per hectare in 1980 to 10.4 in 2000 (a 100% increase in 20 years). Again, between 2000 and 2020, yields increased from 10.4 to 20.4 metric tons per hectare (a 96% increase). Several African countries have managed to sustain high increases over the past two decades (with growth exceeding 100% in 20 years), although most countries boast very low yields per capita and leave room for vast improvement. The intervention in this scenario increases agricultural yields in Africa with 66% over a 20-year time span bringing yields per hectare up from 4 metric tons per hectare in 2019 to 7 metric tons per hectare in 2043. Aggressive intervention for all countries below 4 tons per hectare. Several countries have been moved to less aggressive interventions based on 1) a less favourable climate, 2) less fertile/arable land available, and 3) very aggressive growth or saturation levels reached. Less aggressive intervention for countries with yields between 4 metric tons to 7 metric tons per hectare and countries not deemed suitable for aggressive intervention above. Increased yields are achievable through improved/ inputs such as modern technology, improved seedlings, increased fertiliser use, and land reform.

	to 1.05 by 2033 for Egypt to 1.03 by 2033 for Eswatini and Mauritius	Ensuring yields per hectare do not decline and production is sustained. A very marginal intervention for Eswatini, Mauritius, Egypt, Eritrea and South Africa. It is acknowledged that even in these countries, land can be optimised, and production increased through modern technologies and investment in research and development.
Increase land area equipped for irrigation (Landirareaequipm)	to 1.2 by 2033 and hold for Angola, Burundi, Cameroon, Chad, DR Congo, Ghana, Mozambique, Niger, Rwanda, Togo, Uganda, Lesotho, Burkina Faso and Gambia to 1.15 by 2033 and hold for Eritrea, Guinea Bissau, Mauritania, Namibia, Tanzania, Senegal, Zambia, Cabo Verde, Kenya, Zimbabwe, Mali, Ethiopia, South Africa and Malawi to 1.1 by 2033 and hold for Benin, Botswana, Central African Republic, Congo, Cote d'Ivoire, Gabon, Guinea, Liberia, Nigeria, Sierra Leone, Seychelles, Comoros, São Tomé and Príncipe, Equatorial Guinea, Eswatini, Madagascar and Sudan to 1.05 by 2033 and hold for Tunisia, Somalia, Morocco, Libia, Algeria, Egypt, Mauritius and South Sudan to 1.02 by 2033 and hold for Djibouti	Certain countries record fewer meteorological droughts with more predictable and consistent rainfall. These include the lower-band countries of West Africa and the Western equator countries. Egypt, Libya, Tunisia, and Algeria (dry climates) record fewer meteorological droughts, their dry climate necessitates irrigation through groundwater extraction. However, these countries have already utilised irrigation extensively with fewer expansion possibilities; the smallest intervention is proposed in these countries.
Increase water withdrawal (ground) (waterwithdrawalm)	to 1.05 by 2033 and hold for Uganda, Senegal, Madagascar, Burkina Faso, Malawi, Angola, Namibia, Cabo Verde,	Dryland conditions, variable rainfall and non-perennial rivers necessitates access to sustainable water resources

	Mali, Niger, Chad, Ethiopia, Somalia, Tanzania, Kenya and Mozambique to 1.03 by 2033 and hold for Sudan, Botswana, Zambia, DR Congo, Rwanda, Burundi, Cameroon, Ghana, Togo, Guinea, Gambia and Eritrea to 1.02 by 2033 and hold for Mauritania, Morocco, Eswatini, Algeria, Tunisia, Egypt, Benin, Cote d'Ivoire, Equatorial Guinea, Gabon, Guinea Bissau, Lesotho, Liberia, Nigeria, Sierra Leone and Zimbabwe	such as groundwater. High rainfall bands with fewer meteorological droughts can utilise either rainwater harvests or surface water sources and, therefore, are not increased. High interventions were applied to countries with dryland conditions (steppe, desert) faced with repeated and severe rainfall variability and meteorological droughts. Savanna areas in East Africa with repeated droughts included. Medium interventions for countries with meteorological droughts in savanna and rainforest climates and less severe droughts in steppe climates. Low intervention for groundwater-dependent countries in desert and Mediterranean conditions.
Irrigation, multiplier on land area equipped for irrigation (landirareaequipm)	to 1.1 by 2033 for Morocco to 1.05 by 2033 for Namibia, Comoros, Seychelles, Central African Republic	
Reduce loss rate of agriculture production at point of production (aglossprodm)	to 0.85 by 2033 and hold for Africa	Reduces agricultural loss and waste as share of production by six percentage points (33% reduction) from 2023 to 2033.
Reduce agriculture loss from producer to consumer (aglosstransm)	Interpolate from 1 (2024) to 0.85 by 2033 and hold for Africa	Reduces agricultural loss and waste as share of production by six percentage points (33% reduction) from 2023 to 2033.

Increase food access/calories per capita (clpcm) (total)	to 1.15 by 2033 for South Sudan to 1.1 by 2033 for Sierra Leone, Lesotho, Chad, Kenya, Guinea-Bissau, Libera, Congo, Mozambique, Uganda, DR Congo, Zambia, Zimbabwe, Madagascar, Burundi and Morocco to 1.05 by 2033 for Comoros	Proxy for increased domestic food consumption. Calories per capita increased for countries with very low access (less than 2500 calories by 2030).
Increase forest protection (forestm)	to 1.02 by 2063 for Madagascar, Togo, Burkina Faso, Nigeria, Malawi, Guinea, Gambia, Botswana, Eswatini, Benin, Ghana, Sierra Leone, Central African Republic, Senegal, São Tomé and Príncipe and Cameroon to 1.01 by 2063 for Zimbabwe, Mozambique, Tanzania, Angola, DR Congo, Zambia and Congo	Intervention helps in reducing the rate of conversion for agricultural land. Not applied in countries with more than 70% forest cover (Gabon, Equatorial Guinea, Liberia). A very small increase over 40 years. Countries with critical forests included. This ensures that deforestation is stopped and reforestation slowly takes shape over the course of decades. 1.01 for those above 50% forest cover. 1.02 for critical forests and ecosystems.
Access to rural roads (infraroadraitrgtyr) + (infraroadraitrgtyr)	Initial condition set at 90 in 2017 Years taken 35 after 2023	Increase rural accessibility to all-weather roads. Target 90% access. Slow investment over 35 years but yields benefits. Low intervention (85) set for Somalia, South Sudan, Central African Republic, Comoros and Namibia.

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About the authors

Ms Alize le Roux joined the AFI in May 2021 as a senior researcher. Before joining the ISS, she worked as a principal geo-informatics researcher at the CSIR, supporting various local and national policy- and decision-makers with long-term planning support. Alize has 14 years of experience in spatial data analysis, disaster risk reduction and urban and regional modelling. She has a master's degree in geographical sciences from the University of Utrecht, specialising in multi-hazard risk assessments and spatial decision support systems.

Dr Jakkie Cilliers is the ISS's founder and former executive director of the ISS. He currently serves as chair of the ISS Board of Trustees and head of the African Futures and Innovation (AFI) programme at the Pretoria oce of the ISS. His 2017 best-seller Fate of the Nation addresses South Africa's futures from political, economic and social perspectives. His three most recent books, Africa First! Igniting a Growth Revolution (March 2020), The Future of Africa: Challenges and Opportunities (April 2021), and Africa Tomorrow: Pathways to Prosperity (June 2022) take a rigorous look at the continent as a whole.

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