

SUSTAINABLE AGRICULTURAL PRODUCTIVITY GROWTH

WHAT DOES IT MEAN IN PRACTICE AND HOW TO ACHIEVE IT?

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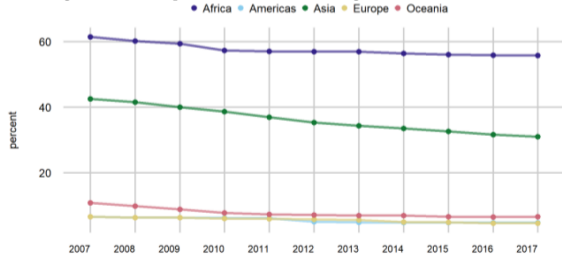
STYLIZED FACTS ABOUT AFRICAN AGRICULTURE



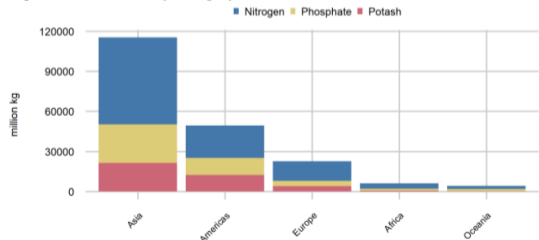
(A): Agriculture, an important economic sector (ag. value added as % of GDP)



(B): Agriculture is still a major employer



(C): Agriculture employs more females (% of females employed)



(D): Low fertilizer use persists (2016)

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- 2 WHY SUSTAINABLE AGRICULTURAL PRODUCTIVITY IN AFRICA
 - Mega trends necessitating Sustainable Agricultural Productivity growth in Africa
- 3 HOW CAN AFRICA ACHIEVE SUSTAINABLE AGRICULTURAL PRODUCTIVITY GROWTH?
 - Climate Smart Agriculture is part of the solution
 - Impacts of CSAs on productivity and resilience
- 4 HOW CAN SSA MAKE SUSTAINABLE AGRICULTURAL PRODUCTIVITY PRACTICAL?
- 5 TAKE HOME MESSAGES

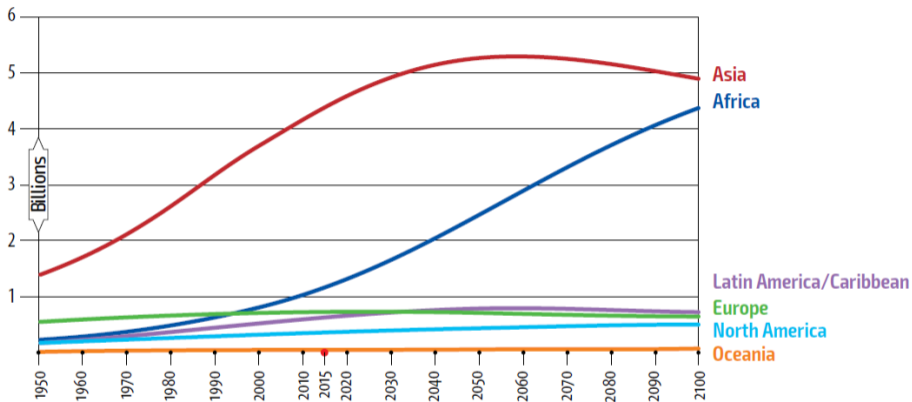
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- **Sustainable Agricultural Productivity growth:** means increasing productivity without negatively affecting the natural resources
 - ▶ synonymous with sustainable intensification (SI) and climate-smart agriculture (CSA)
- **Sustainable Intensification:** refers to ‘producing more output from the same area of land while reducing the negative environmental impacts and enhancing contributions to natural capital and the flow of environmental services’ (Pretty et al., 2011).
- **Climate Smart Agriculture (CSA)** is defined by its objectives to raise productivity and farm incomes, enhance adaptation and resilience to climate change and reduce emissions
 - ▶ Sustainable intensification is integral to CSA (Lipper et al., 2014).

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Mega trends necessitating Sustainable Agricultural Productivity growth in Africa

1. RAPID POPULATION GROWTH TO TOP 2 BILLION BY 2050

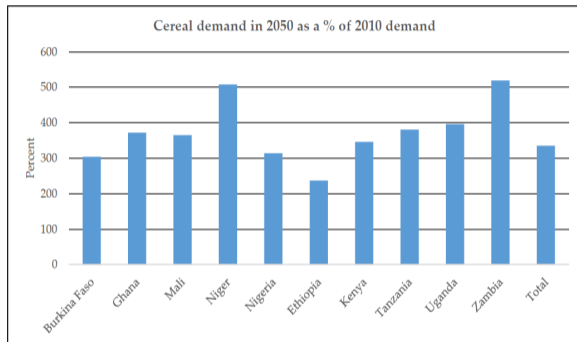


Source: UN, 2015.

Source: FAO (2017)

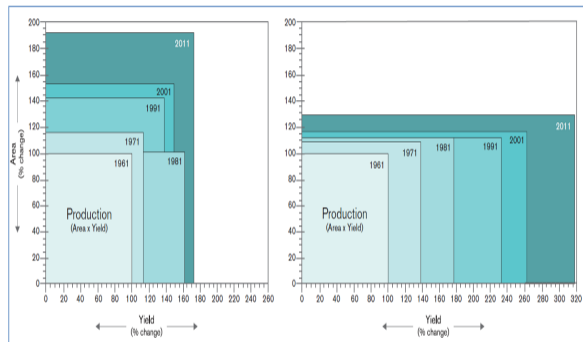
- infact, about 25% of the world population will be in SSA by 2050

2. FOOD DEMAND TO RISE BY MORE THAN 300% BY 2050



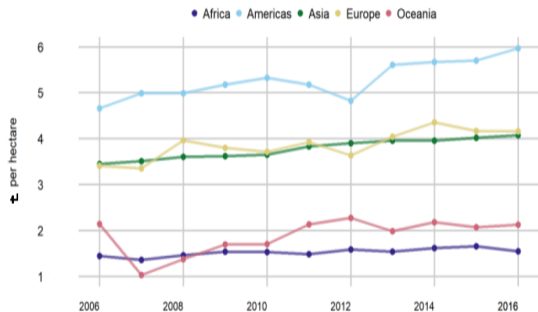
Production needs to double to meet food demand by 2050

Source: van Ittersum et al. (2016)

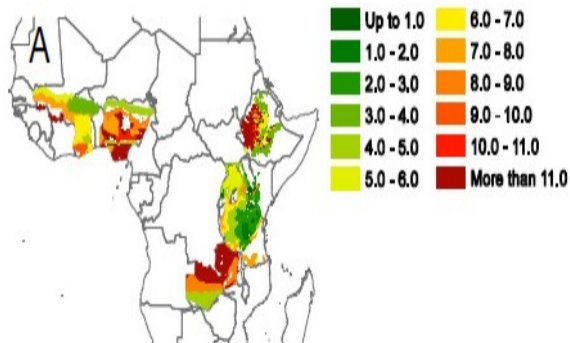


Source: Jones and Franks (2015)

3. LOW AGRICULTURAL PRODUCTIVITY, < 2T/HA

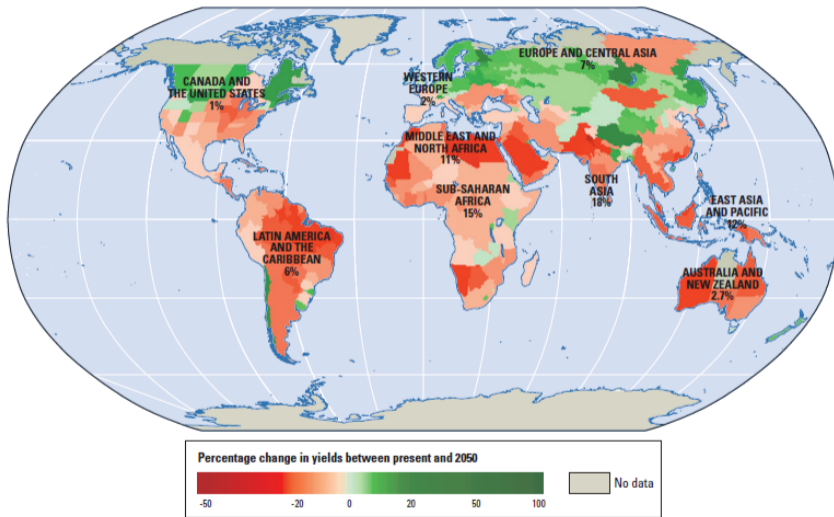


Cereal yields among the lowest in SSA
Source: FAO (2017)



Large yield gaps in Maize in SSA
Source: van Ittersum et al. (2016)

4. CLIMATE CHANGE WILL FURTHER DEPRESS YIELDS BY 2050



Source: WorldBank (2010)

THESE MEGA TRENDS DEFINE A SUSTAINABILITY CHALLENGE

Not only are agricultural systems in sub-Saharan Africa (SSA) expected to double production by 2050 in order to meet the threefold increase in food demand and more diverse diets, they have to do so while sustainably managing natural resources, adapting to, and mitigating climate change.

THE SUSTAINABILITY CHALLENGE UNDERPINS SDG 2: ZERO HUNGER BY 2030

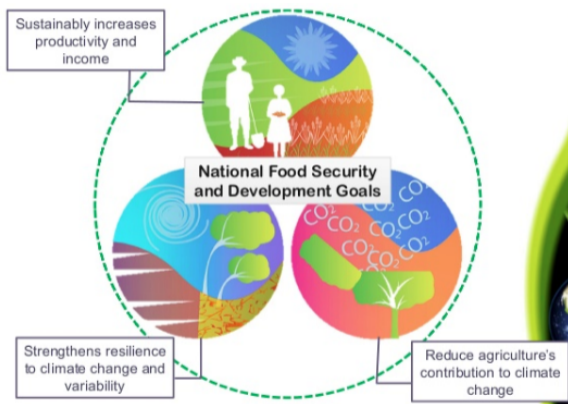


End hunger, achieve food security and improved nutrition and promote sustainable agriculture

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 - **Climate Smart Agriculture is part of the solution**
 - **Impacts of CSAs on productivity and resilience**
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How can Africa achieve sustainable agricultural productivity growth?

CLIMATE SMART AGRICULTURE (CSA) IS PART OF THE SOLUTION



<https://csa.guide/csa/what-is-climate-smart-agriculture>

CSA IS NATIONAL POLICY IN SOME SSA COUNTRIES



Source: (Giller et al., 2015)

CSAs MAY INCLUDE DIFFERENT TILLAGE SYSTEMS



Source: Giller et al. (2015)

LOTS OF LITERATURE ON CSA IN SSA

PERSPECTIVE

PUBLISHED ONLINE 26 NOVEMBER 2014 | DOI: 10.1039/C4NP00047A



Climate-smart agriculture for food security

Leslie Lipper *et al.*^a

Climate-smart agriculture (CSA) is an approach for transforming and reorienting agricultural systems to support food security under the new realities of climate change. Widespread changes in rainfall and temperature patterns threaten agricultural production and increase the vulnerability of people dependent on agriculture for their livelihoods, which includes most of the world's poor. Climate change disrupts food markets, posing population-wide risks to food supply. Threats can be reduced by increasing the adaptive capacity of farmers as well as increasing resilience and resource use efficiency in agricultural production systems. CSA promotes coordinated actions by farmers, researchers, private sector, civil society and policymakers towards climate-resilient pathways through four main action areas: (1) building evidence; (2) increasing local institutional effectiveness; (3) fostering coherence between climate and agricultural policies; and (4) linking climate and agricultural financing. CSA differs from 'business-as-usual' approaches by emphasizing the capacity to implement flexible, context-specific solutions, supported by innovative policy and financing actions.

Renewable Agriculture and Food Systems 20(4): 328–348

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Conservation agriculture in Southern Africa: Advances in knowledge

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Review Article

LETTER

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Productivity limits and potentials of the principles of conservation agriculture

Cameron M. Pittelkow¹*, Xinqiang Liang², Bruce A. Linquist³, Kees Jan van Groenigen⁴, Juhwan Lee⁵, Mark E. Lundy⁶, Nataja van Gestel⁷, Johan Six⁸, Rodney T. Venterea⁹ & Chris van Kessel¹⁰

Agriculture, Ecosystems and Environment 222 (2013) 112–124

Contents lists available at ScienceDirect

Agriculture, Ecosystems and Environment

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Evaluating manual conservation agriculture systems in southern Africa

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The spread of Conservation Agriculture: justification, sustainability and uptake

Amir Kassam¹, Theodor Friedrich¹, Francis Shaxson² & Jules Pretty

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Does conservation agriculture deliver climate change mitigation through soil carbon sequestration in tropical agro-ecosystems?

David S. Powlson¹*, Clare M. Stirling², Christian Thierfelder³, Rodger P. White⁴, M.L. Jat⁵

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Field Crops Research

journal homepage: www.elsevier.com/locate/fcr

When does no-till yield more? A global meta-analysis

Cameron M. Pittelkow¹*, Bruce A. Linquist², Mark E. Lundy³, Xinqiang Liang⁴, Kees Jan van Groenigen⁵, Juhwan Lee⁶, Nataja van Gestel⁷, Johan Six⁸, Rodney T. Venterea⁹, Chris van Kessel¹⁰

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Does minimum tillage with planting basins or ripping raise maize yields? Meso-panel data evidence from Zambia

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Review

Conservation agriculture and smallholder farming in Africa: The heretics' view

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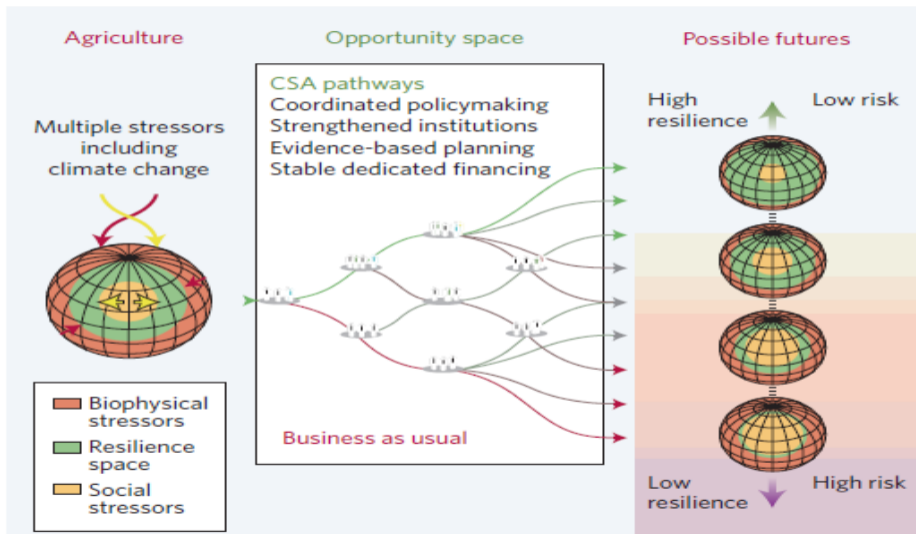
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- While evidence on the effects of CSA on productivity are mixed at global level (Pittelkow et al., 2015), the weight of evidence in SSA suggest average positive yield gains in medium to long-term (Thierfelder et al., 2017; Lipper et al., 2014; Thierfelder et al., 2016)
- CSAs have positive adaptation and resilience effects
- There is thin evidence on livelihood effects; positive (Ngwira et al., 2013; Tambo and Mockshell, 2018) and neutral (Jaleta et al., 2016; Ngoma, 2018)
 - ▶ causal evidence on livelihood effects too thin to generalize, intra regional differences abound
- More research is needed on the effects of CSAs on climate change mitigation (Powlson et al., 2016; Ngoma and Angelsen, 2018)

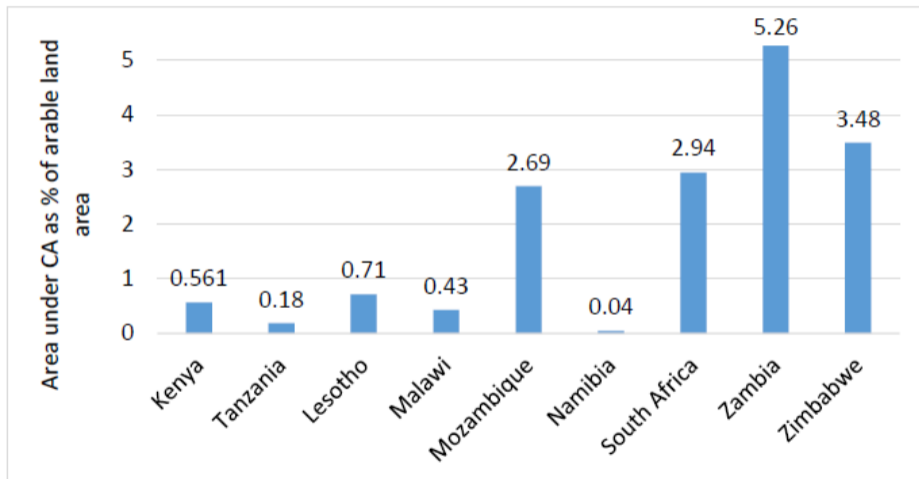
CSAs KEY TO BUILD RESILIENT AGRICULTURAL SYSTEMS



Climate-resilient transformational pathways, Source: Lipper et al. (2014)

BUT, THERE IS AN ADOPTION PROBLEM

- CSAs (such as CA) occupy less than 10% of arable land and adoption is (s)low



CA area as % of arable land, Source: FAO AQUASTAT

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How can SSA make sustainable agricultural productivity practical?

(1) BUILD INSTITUTIONS AND SUPPORTIVE POLICY ENVIRONMENT TO:

- facilitate appropriate CSA policies where these are lacking
- enable and fast-track implementation where policies exist but are not implemented
 - ▶ most SSA countries are here: they have good CSA policies that are never see the light of day
- re-focus development policy towards CSA-led agricultural transformation
- foster policy coherence among natural resources management and agricultural policies in order to amplify synergies and minimize trade-offs
- raise the requisite funds to support scaling-up and scaling-out
- **Question: How do national policies support CSA institutions?**

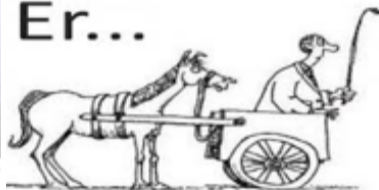
MAKE NO MISTAKE: POLICY CHANGE IS DIFFICULT, ITS POLITICAL



Policy Stability?



Er...



Insatiable appetite to do wrong things

(2) BUILD THE EVIDENCE BASE TO SUPPORT CSA

*More spatially disaggregated evidence is needed on what works where and under what conditions, and on barriers to adoption and how to overcome these. Funding agricultural R&D and extension is needed: 'No agricultural practice is climate-smart everytime and everywhere.' Locally adapted policies are key to make CSA real. **Question: To what extent are current CSA policies evidence-based or-informed?***

(3) ADDRESS RISKS FACED BY FARMERS

*Risk aversion and impatience was found to reduce CSA adoption by 7 and 10 percentage points, respectively (Ngoma et al., 2018). But providing insurance and 'green' subsidies increased adoption by 6 - 12 percentage points and builds resilience. Thus, adoption can be nudged and resilience built with the right policy instruments. **Question: How can national policies support such CSA levers?***

(4) INVOLVE BOTH PRIVATE AND PUBLIC SECTOR PLAYERS

- private sector is needed to facilitate climate-smart supply chains for organic fertilizers and liming
- private sector is needed to perform soil testing to inform input recommendations
- the public sector needs to recast their policy focus from traditional input subsidies to flexible, electronic voucher-based programs that can allow farmers to redeem lime and organic fertilizers, and access soil testing services
- **Question: How best can public policy facilitate private sector participation in CSA-supportive value chains?**

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- 1 The future of African agriculture is green; climate-smart agriculture is part of the solution to raise productivity to meet rising food demands and diversity despite climate change. This is not business as usual.
- 2 Supportive policies are needed to facilitate uptake, build requisite institutions to push forward the climate-smart agriculture agenda, and to address problems of low adoption and covariate risk.
- 3 The private sector is needed to develop CSA-supportive supply chains and provide soil testing services, liming and organic fertilizers to improve land productivity.
- 4 Public sector policies for agricultural and rural development need a paradigm shift towards climate- and market-smartness.

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