Sentinel
Social and Environmental Trade-Offs in African Agriculture

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Food and forests: understanding agriculture and conservation trade-offs in Ethiopia

In Ethiopia, as in many countries in Africa, policymakers need to better understand and manage the major trade-offs — existing and future — between two competing objectives: increasing agricultural production to meet growing domestic food demand and conserving nature.

Figure 1. Change in cereal yield and cultivated area, Ethiopia 1994–2014 (based on FAO data[3])

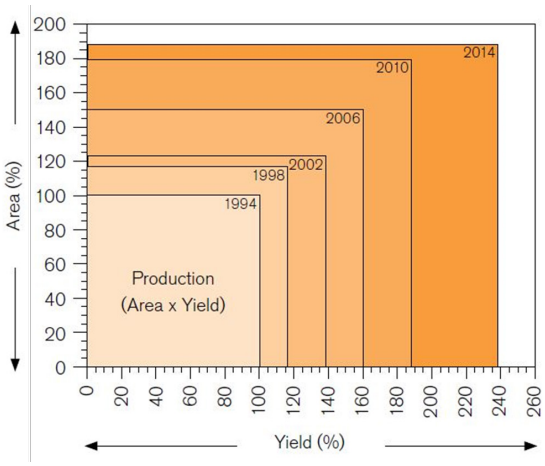
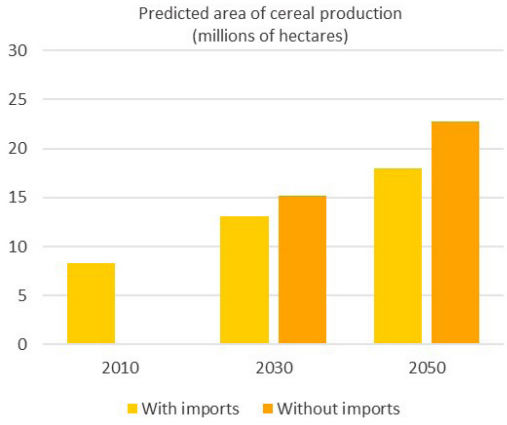


Figure 2. Cereal area with and without imports (from IFPRI's IMPACT model[2])



Competing policy objectives and implications for land use

Cereal production in Ethiopia increased 4.5x between 1994 and 2014 (see Figure 1). Based on the IMPACT model of International Food Policy Research Institute (IFPRI)[2], van Ittersum et al. in their paper "Can sub-Saharan Africa feed itself?" note that food demand in Africa is projected to triple over the period 2010–2050 — a growth rate much higher than in other continents.[4] This growth in demand is a function of improving food security and increasing consumption of meat as well as population growth. In Ethiopia, cereal demand is predicted to grow by a factor of 2.6 over this period which will continue to drive expansion of the cereal area.

Ethiopia has long recognised the importance of agriculture sector transformation for stability and growth. Over two decades ago, Ethiopia put agriculture at the heart of its economic development by launching its Agricultural Development Led Industrialization (ADLI) strategy. Agriculture continues to be central to national development planning, and in the last 10 years Ethiopia has achieved remarkable increases in crop production largely through increasing yields per hectare (ha). For example, over the period 2007–2017 cereal production increased by a factor of 2.15 (i.e. more than doubled) from a 76% increase in yield and a 22% increase in the cropped area.

Summary

Agricultural expansion is the number one driver of the loss of nature and its biodiversity and ecosystem services.[1] But efforts to rapidly reduce these losses must recognise the political and economic realities of developing countries striving for economic growth and poverty eradication in the face of climate change. How to balance the competing objectives of agricultural production (SDG 2) and nature conservation (SDG 15) is a critical challenge for sustainable development, and there is growing recognition that success will require transformative change.

Background

In contrast to the situation in Latin America and parts of Southeast Asia, in most countries in Africa it is the expansion of staple food crops to meet growing domestic demand rather than export commodities which drives the loss of nature and its biodiversity and ecosystem services. In Ethiopia, the expansion of cereal production over the period 2010–2050 is projected to far exceed that of any other crop type.[2]

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The current agricultural strategy — the second Growth and Transformation Plan (GTP II) — aims to increase agricultural productivity by a further 47% over the period 2016–2020 so that the country can achieve and maintain national self-sufficiency in staple food crops. Most of this growth is still in the smallholder sector but large-scale commercial farms are increasingly significant, and disproportionately so in terms of environmental impact since the allocated land has been mainly in the country's more forested areas in the west (see Figure 3).

The United Nations Food and Agriculture Organization (FAO) estimates that the average annual deforestation rate from 1990 to 2010 was 0.93%, and during this period Ethiopia lost 18.6% of its forest cover.[6] Meanwhile, the REDD+[7] readiness preparedness plan estimated annual forest clearing rates for the country's three most-forested regions at 1.16% in Oromia, 1.28% in Gambela and 2.35% in the Southern Nations, Nationalities, and People's Region (SNNPR).[8] Government projections in 2011 indicated that if no action is taken to change the country's development path, 9 million ha would be deforested between 2010 and 2030.[9] This would be most of the natural forest outside of protected areas.

Agricultural expansion is the most significant economic driver of deforestation and biodiversity loss in Ethiopia as in most other countries in Africa. An in-depth study of the drivers of deforestation was conducted for the Ethiopia's Forest Reference Level submission to the United Nations Framework Convention on Climate Change (UNFCCC).[10] This indicates that 53% of the deforestation that takes place is conversion to agriculture and grassland (see Figure 4). In accordance with UNFCCC standards the term 'agriculture' refers to crop production, and 'grassland' refers to improved or unimproved grazing.

The IMPACT model[2] predicts that the country will produce 83% of its total requirement for cereals in 2050 and will import the remaining 17%. Under this scenario, and assuming no increase in yield/ha from the 2008–2012 average, the area of cereals would expand by only 2.2x rather than the 2.7x expansion needed if the country was to become self-sufficient in cereals (see Figure 2). However, the country is aiming for self-sufficiency in staple food crops and Figure 5 shows the area of cereal production that would be needed to achieve this for different scenarios of crop yield.[4] The dotted yellow line shows the total area of land suitable for cereal production including areas of forest outside protected areas.[11] Even if cereal yields could reach 50% of the potential maximum — not very likely given the increasing frequency of drought — most of the potentially suitable non-forest and forested land would be used by 2050. Suitability is defined in purely agroecological terms. If the profitability of cereal production is also taken into account, the area of suitable land is substantially reduced as some of the land has poor market access. Under current conditions of environmental governance, it may be hard to ensure that agricultural expansion takes place in areas that are less important for biodiversity and ecosystem services but also less profitable for farming.[12]

Figure 4. Land uses replacing forests over the period 2000–2013 (as % of total forest loss over this period) — graph reproduced from Ethiopia's Forest Reference Level submission, 2016[10]

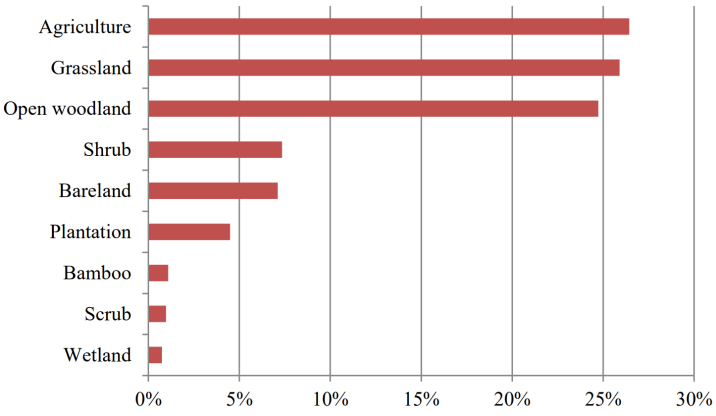
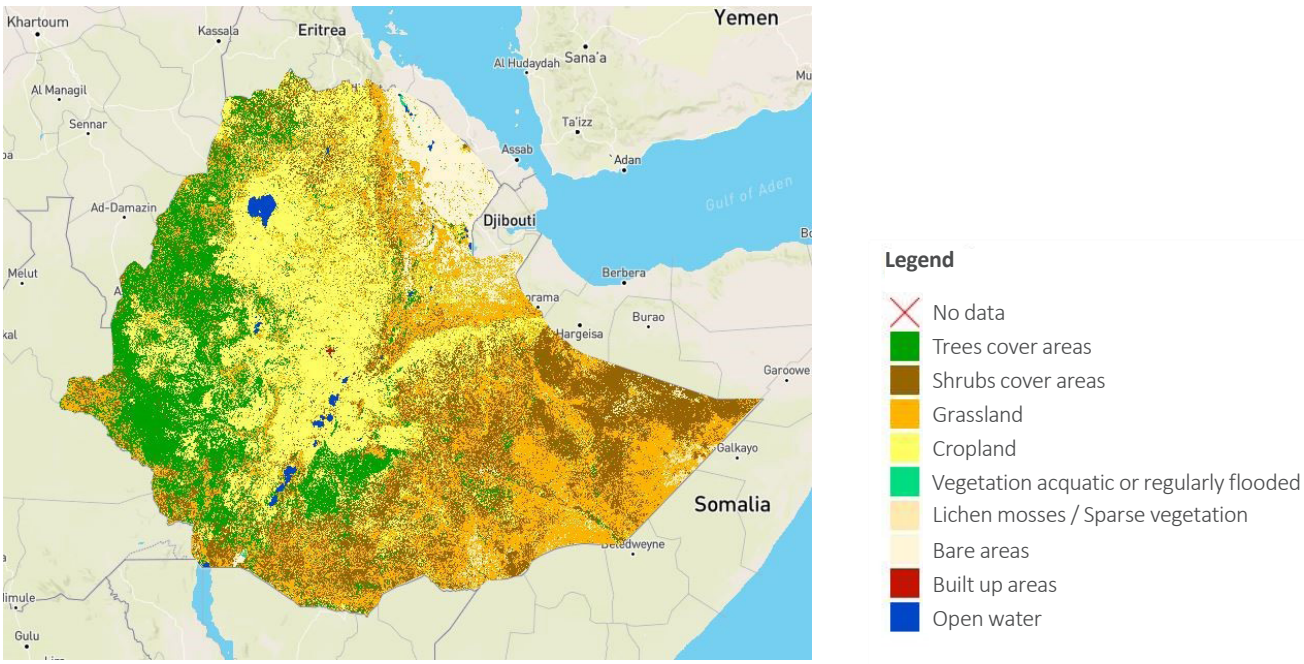


Figure 3. Ethiopia land cover (map developed using RCMRD SERVIR Eastern and Southern Africa[5])

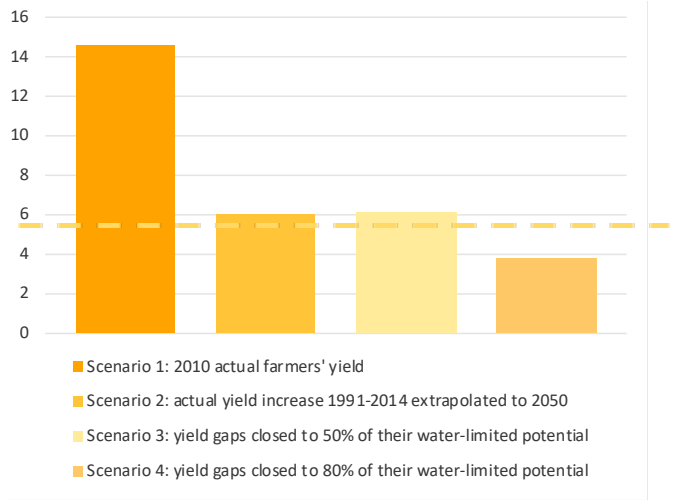


Box 1. Ethiopia in brief

Ethiopia is the second most populous country in Africa after Nigeria, with an estimated 104.9 million people and a population growth rate of 2.5% (2017). Some 80% of the population lives in rural areas. It comprises 111.5 million ha (over 1.1 million km^2), of which 74 million ha is deemed suitable for agriculture. Ethiopia is fundamentally an agrarian country. Although the transformation towards a more manufacturing and industrially-oriented economy is well under way, the agriculture sector continues to dominate the economy, accounting for 36% of gross domestic product (GDP), 73% of employment, and nearly 76% of export earnings.[13] Major agricultural exports include coffee, sesame seeds and flowers. The majority of the agriculture sector is made up of smallholder farmers who live off less than one hectare of land.

Over the past decade, the country has experienced sustained rapid and inclusive economic growth, averaging 10.4% per year since 2004.[14] Extreme poverty fell from 55% in 2000 to 33% in 2011. Ethiopia's rapid and sustained growth has been driven by agriculture and service sector growth. In 2016, the agriculture sector accounted for 41% of GDP while the service sector accounted for about 43% of GDP.

Figure 5. Cereal area (Mha) required to be self-sufficient by 2050 (reproduced from van Ittersum et al., 2016)[4]



Are agricultural and environmental policies working for trade-off management?

In Ethiopia, policymakers continue to devise agricultural development, environmental and conservation policies based on an insufficient understanding of the trade-offs — existing and future — between the competing objectives of producing more food and the conservation of nature and its biodiversity and ecosystem services. This is all too clear with the current agricultural strategy proposing expansion of the cropped area by nearly 4% with at least 2.5% coming from forested land.

Meanwhile, the government has committed under the New York Declaration on Forests to halving deforestation by 2025 and to huge programmes of tree planting and forest landscape restoration.

At present, the highest rates of conversion of natural forests are in the west of the country where 1.7 million ha of land was allocated to large-scale commercial agriculture over the period 2002–2012. Although national environmental policy requires that environmental impact assessments (EIAs) be conducted to inform appropriate impact mitigation actions, the assessments have in many cases been little more than a paper exercise.[15] Another great concern is about commercial farming measures to intensify agriculture to increase productivity. In situations of relatively weak environmental governance, these tend to increase rather than reduce the pressure on forests – through an effect known as Jevons paradox.[16]

Within the smallholder sector there have been major improvements in productivity (yields/ha) in recent years — a 76% increase between 2007–2017. This is a reflection of a major investment in agricultural extension and the supply of fertiliser and other agricultural inputs. In contrast to large-scale commercial agriculture, the risk of intensification being a driver of deforestation is less because of land-use regulation at local government level, including processes to restore degraded semi-natural communal lands and village-level land-use planning.[17] Nonetheless, in a country where the average farm size is less than 1 ha – too small for subdivision amongst the next generation – there is intense demand for new land from the younger generation which is a major factor in deforestation levels remaining amongst the highest in Africa.

Box 2. Commitments under regional agriculture policies

Ethiopia is one of the signatories of the Comprehensive Africa Agriculture Development Programme (CAADP). It was launched during the second Africa Union Assembly held in 2003 in Maputo, Mozambique. Parties have committed to allocating at least 10% of their national budgets to agriculture to achieve 6% annual growth of the agriculture sector.[18] Ethiopia has also endorsed the Malabo Declaration on Accelerated Agricultural Growth and Transformation for Shared Prosperity and Improved Livelihoods. The declaration includes targets to end hunger, halve poverty, and ensure at least 30% of farm/pastoral households are resilient to climate shocks in Africa by 2025.[19] Ethiopia is one of the leaders in Africa in progress towards meeting these targets.

Protected areas represent an extreme form of land-use control. Ethiopia's protected areas account for an estimated 14% of land[20] and generate substantial tourism opportunities and ecosystem services. However, many of these protected areas are threatened by:

- Settlement and farming within the parks or adjacent to them
- Deforestation

• Mineral extraction, and
• Forest fires.

Despite major efforts to control illegal encroachment of people, their farming and/or livestock, the biodiversity status of some key protected areas continues to deteriorate.[21] If targets to reduce and reverse deforestation and biodiversity loss remain in place, agricultural and conservation policies are on a collision course. This can be seen as a failure to recognise the major trade-offs that exist. We might ask why these are not recognised given that they are very visible in the national development plans. Research on this topic in other countries[22] has identified three possible explanations:

• Trade-offs may be invisible to people working in their sectoral siloes (e.g. ministries for agriculture or the environment).

• Perceptions of what is a win or a loss may be very different according to knowledge, values, beliefs or well-being etc.

• Trade-offs may be deliberately hidden for a variety of reasons including win–win solutions being more socially, psychologically and politically attractive or because the topic is taboo.

Barriers to recognising, understanding and better managing the trade-offs include:[15]

• Weak functional links and coordination between different organs of government ministries (for example, investment authorities, agriculture and forestry). Sectoral ministries promote their mandates, but mechanisms to align these mandates have often been weak. Cross-sectoral synergy in policy, joint planning and implementation is rare. Lack of coordination among the relevant institutions (investment, agriculture, environment, energy, forestry) is contributing to increased deforestation and loss of biodiversity.

• Overlapping mandates and activities between different government bodies. For example, rehabilitation of degraded areas is undertaken by both the Ministry of Agriculture (MoA) and the Environment, Forest and Climate Change Commission (EFCCC).

• Discrepancies exist at various levels (national, sub-national and local) in the capacities, responsibilities and priorities of key stakeholders in making and implementing land-use decisions.

• Frequent restructuring or institutional reorganisation of ministries with changing mandates has created problems. Collaboration among line ministries (for example, between the Ministry of Agriculture and Natural Resources, MoANR, and the Ministry of Environment, Forest and Climate Change, MoEFCC) is still relatively weak. The changing mandates have caused confusion over land management, especially for reforestation on degraded agricultural land.

• In some cases, information necessary for the effective management of risks and trade-offs (for example, spatial data on deforestation and threats to biodiversity) exists but is publicly unavailable; in other cases, this information is lacking.

• At the regional level, environmental bureaus and agencies have a wide range of environmental responsibilities and roles, some of which overlap with sectoral mandates. These responsibilities and roles are not, however, matched with adequate human and technical resources. All regional states and local governments (zones, woredas and kebeles) face technical capacity constraints to effectively set, implement and/or enforce environmental laws, regulations and standards.

• There is a lack of or weak implementation capacity at woreda level, even though policies and institutional frameworks for sustainable natural resource management are largely in place.

• There is also a lack of government commitment at sector level: GTP II, and its strong alignment with the Climate Resilient Green Economy (CRGE) strategy, suggests that biodiversity is fairly high on the federal government's policy agenda. But this does not seem evident at the sector levels, such as in agriculture and forestry. In addition to the challenges posed by institutional change, there is a lack of appreciation among forestry and agriculture policymakers of the importance of biodiversity.

Box 3. Commitments under global environment and conservation policies

Ethiopia has ratified all the key international environmental conventions including the Convention on Biological Diversity (CBD), Convention on Wetlands (Ramsar Convention), Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), and the Paris Agreement under the United Nations Framework Convention on Climate Change (UNFCCC). Under UNFCCC, Ethiopia is a recognised leader in Africa with its pioneering Climate Resilient Green Economy (CRGE) strategy published in 2011. This strategy aims to make Ethiopia a middle-income country by 2025 while keeping greenhouse gas emissions at the current level of 150 Mt CO_2e.[9] This is an ambitious target in comparison with the 400 Mt CO_2e greenhouse gas emissions that would result if the country chose to pursue conventional development.

GTP II suggests that biodiversity is fairly high on the government's policy agenda. Indeed, cognisant of the problems of biodiversity loss, the government implemented its first National Biodiversity Strategy and Action Plan (NBSAP) over the period 2005–2010 to guide national efforts in conservation, sustainable utilisation and fair access (through benefit sharing). The second NBSAP (2015–2020) is being implemented, with national targets considered when determining the spatial priorities to establish and safeguard protected areas, reduce agricultural expansion, increase forest cover, and manage wetlands.

Looking ahead: key messages

A number of good policies exist in Ethiopia for the sustainable management of land and natural resources. There has also been the political will at high levels to support this. But there are disconnects between policies of different sectors which leave agriculture and environment on a collision course with negative impacts both for people and the environment.

The challenge in recent years has been not so much commitments from high-level politicians but rather the major disconnects between policy commitments of different sectors that are incompatible and, in reality, already colliding. This has serious negative impacts on the environment (as there is little or no attempt to mitigate the trade-offs). But there are also, in many cases, negative impacts on people whose well-being is dependent on ecosystem services that are lost and/or traditional smallholder agriculture that is displaced. In other words, even where the environmental dimension of the trade-off is recognised there is potentially an important social dimension that is still overlooked.

The way forward begins with a better understanding of these trade-offs and an open discussion about the competing objectives — and how these trade-offs could be better managed. In all countries we have studied, there is a need for horizontal and vertical policy integration. But this may be particularly the case in Ethiopia, which has a federal government system that grants a high level of autonomy to different regions of the country and lessens the power of central government to ensure effective coordination and coherence.

Policymakers and planners must engage the full range of stakeholder interests in processes involving trade-off management, notably land-use planning and the management of protected areas. Particular attention needs to be paid to the engagement of stakeholders who have a strong interest in the outcome but little influence, and who are therefore more likely to lose out, such as poorer people who are more dependent on use of common pool resources and youth who have no farmland. Given the extreme pressure on land, this will require not only biophysical interventions such as improved farming practices and land-use planning to increase productivity but also improvements in governance and other measures to enhance stakeholder engagement in trade-off management that are fundamental to transformative change.[12]

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About the Science for Nature and People Partnership (SNAPP)

The mission of SNAPP is to deliver evidence-based, scalable solutions to global challenges at the intersection of nature conservation, sustainable development, and human well-being.

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References

1 IPBES (2019) *Summary for policymakers of the global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*. S Díaz, J Settele, ES Brondízio, et al. (eds). IPBES secretariat, Bonn, Germany. https://tinyurl.com/tt32rnd

2 IFPRI's International Model for Policy Analysis of Agricultural Commodities and Trade (IMPACT). See www.ifpri.org/program/impact-model

3 Food and Agriculture Organization of the United Nations. (1997). *FAOSTAT statistical database*. FAO, Rome. http://www.fao.org/faostat/

4 van Ittersum MK, van Bussel LGJ, Wolf J, et al. (2016) Can sub-Saharan Africa feed itself? *PNAS* 113(52): 14964-14969. https://doi.org/10.1073/pnas.1610359113

5 Regional Centre for Mapping of Resources and Development (RCMRD) SERVIR: Eastern and Southern Africa. See http://servir.rcmrd.org/

6 FAO (2010) *Global forest resources assessment 2010: country report Ethiopia*. FAO, Rome. www.fao.org/3/al501E/al501e.pdf

7 Reducing emissions from deforestation and forest degradation and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries (REDD+). See https://unfccc.int/topics/land-use/workstreams/reddplus

8 FDRE (2011) *REDD+ Readiness Preparation Proposal (R-PP) submitted to Forest Carbon Partnership Facility (FCPF)*. Federal Democratic Republic of Ethiopia (FDRE), Addis Ababa. https://tinyurl.com/yx5fp3zr

9 FDRE (2015) *Ethiopia's Climate-Resilient Green Economy Climate Resilience Strategy: Agriculture and Forestry*. Federal Democratic Republic of Ethiopia (FDRE), Addis Ababa. https://tinyurl.com/re5lcc3

10 FDRE (2016) *Ethiopia's Forest Reference Level submission to the UNFCCC, January 2016*. Federal Democratic Republic of Ethiopia (FDRE), Addis Ababa. https://tinyurl.com/wdhmsug

11 Chamberlin J, Jayne TS, Headey D, et al. (2014) Scarcity amidst abundance? Reassessing the potential for cropland expansion in Africa. *Food Policy* 48: 51–65. https://doi.org/10.1016/j.foodpol.2014.05.002

12 Franks P (2019) *Conservation versus food production in Africa: better managing trade-offs*. IIED, London. https://pubs.iied.org/17738IIED/

13 FDRE (2016) *Growth and Transformation Plan II (GTP II) (2015/2016–2019/20)*. Federal Democratic Republic of Ethiopia (FDRE), Addis Ababa. https://tinyurl.com/tggnfsv

14 Donnenfeld Z, Porter A, Cilliers J, et al. (2017) *Ethiopia Development Trends Assessment: Ethiopia Performance Monitoring and Evaluation Service (EPMES) 2 March 2017*. https://ssrn.com/abstract=3099366

15 Franks P, Hou-Jones X, Fikreyesus D, et al. (2017) *Reconciling forest conservation with food production in sub-Saharan Africa: case studies from Ethiopia, Ghana and Tanzania*. IIED, London. https://pubs.iied.org/17605IIED/

16 Byerlee D, Stevenson J & Villoria N (2014) Does intensification slow crop land expansion or encourage deforestation? *Global Food Security* 3(2): 92-98. https://doi.org/10.1016/j.gfs.2014.04.001

17 Hou-Jones X, Franks P & Chung JH (2019) *Creating enabling conditions for managing trade-offs between food production and forest conservation in Africa. Case studies from Ethiopia and Zambia*. IIED, London. https://pubs.iied.org/13611IIED

18 AU/NEPAD (2013) *Zambia agriculture investment opportunities brief*. CAADP Investment Facilitation Programme. https://www.abghq.com/downloads/Zambia.pdf

19 AU (2014) *Malabo declaration on accelerated agricultural growth and transformation for shared prosperity and improved livelihoods*. http://bit.ly/2qfDCKg

20 FDRE (2015) *Ethiopia's National Biodiversity Strategy and Action Plan 2015-2020*. Federal Democratic Republic of Ethiopia (FDRE), Ethiopian Biodiversity Institute, Addis Ababa. https://tinyurl.com/w9zfey5

21 Zerga B (2015) Awash National Park: Its degradation status and protection measures. *Palgo J Agric* 2(3): 57-66. https://tinyurl.com/u738zxs

22 Galafassi D, Daw TM, Munyi L, Brown K, Barnaud C & Fazey I (2017) Learning about social-ecological trade-offs. *Ecology and Society* 22(1): 2. https://doi.org/10.5751/ES-08920-220102

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Sentinel is an an interdisciplinary research project seeking to address the challenge of achieving 'zero hunger' in sub-Saharan Africa, while at the same time reducing inequalities and conserving ecosystems.

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