

# GROWING FOOD IN A FINITE WORLD

Case studies of The Nature Conservancy's key agriculture solutions



## Global Agriculture Projects

## Global Agriculture Projects

Experts agree that world food production will need to massively increase by 2050. But such production cannot be achieved by doubling land or water use—quite simply, there is not enough of either. Agriculture must get smarter, using land more productively and water more efficiently if we are to reconcile the need for growth with the need to preserve all of our natural resources, safeguard natural habitats and keep the climate in safe boundaries.

At The Nature Conservancy, we know we cannot achieve mission success without addressing unsustainable agricultural practices, whether in the fields where crops are produced, in the forests where agriculture is encroaching, or on the rangelands where animals graze. These case studies offer an overview of our work in five countries: Brazil, Indonesia, Kenya, Mexico and the United States. While not all-encompassing, these case studies provide an overview of our thinking and of the types of projects we invest in.

Ours is an ambitious vision—to achieve our objectives, tens of millions of farmers across the world need to change their behaviors. But by targeting our work in the right places and influencing the right set of public and private institutions, we are moving from the theory to the practice of change, ensuring we can feed a growing population while maintaining a balance between development and conservation.



A young woman picking tea leaves on a tea plantation in the Upper Tana Watershed, Kenya. Photo Credit: ©Nick Hall

### Case Studies:

#### **NAIROBI WATER FUND »**

SAVING SOIL AND WATER IS SAVING LIVES IN KENYA'S TANA RIVER BASIN

#### **THE SOUTHERN AGRICULTURAL GROWTH CORRIDOR »**

LAYING THE FOUNDATION FOR SMART PLANNING FOR SUSTAINABLE AGRICULTURE IN TANZANIA

#### **SUSTAINABLE PRODUCTION IN BRAZIL »**

COLLABORATION TO CONSERVE FORESTS AND ENHANCE LIVELIHOODS

#### **EAST KALIMANTAN GREEN GROWTH COMPACT »**

A PARTNERSHIP FOR PROSPERITY AND CONSERVATION IN THE TROPICAL FOREST

#### **YUCATAN PENINSULA SUSTAINABLE RURAL DEVELOPMENT INITIATIVE »**

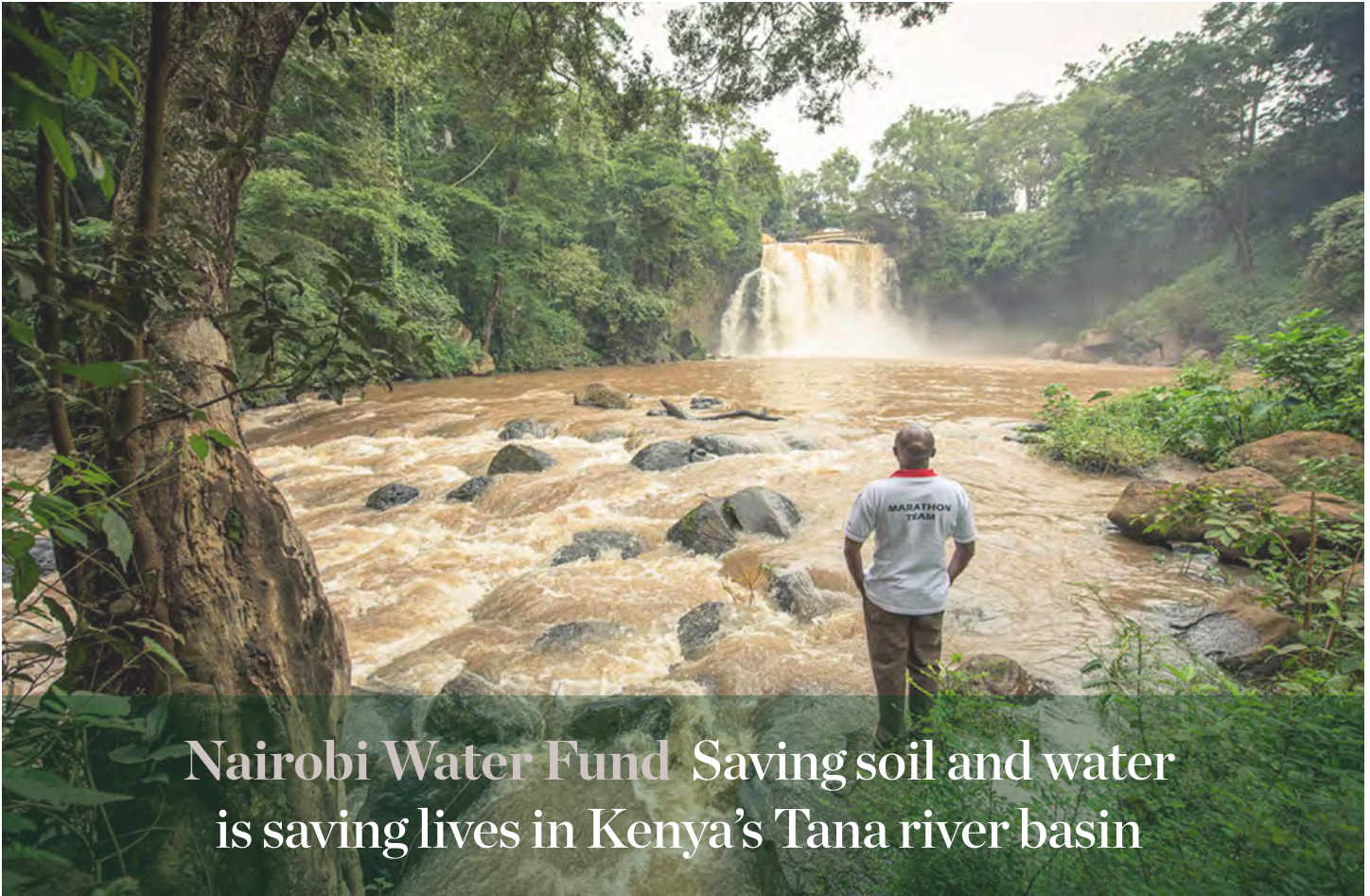
HALTING DEFORESTATION AND BOOSTING FARMING PRODUCTIVITY IN THE MAYAN FOREST

#### **WESTERN NEBRASKA IRRIGATION PROJECT »**

SAVING WATER - AND MONEY - THROUGH PRECISION IRRIGATION

#### **SUSTAINABLE GRAZING LANDS »**

PUTTING LAND TO WORK FOR PEOPLE AND NATURE



Fred Kihara, TNC Africa Program, looking at the Chania Falls in Thika near Nairobi in the Upper Tana Watershed, Kenya. © Nick Hall/TNC

**T**he Tana River flows for 1,000 km from the Aberdare mountains north of Nairobi to the Indian Ocean. It is Kenya's longest river, and supplies 95 percent of the water used by more than 9 million people in and around the capital city of Nairobi, as well as 70 percent of the country's hydropower. This project focuses on the 17,000 km<sup>2</sup> Upper Tana Watershed, which drains the Mount Kenya World Heritage Site and the Aberdare National Park, two major "water towers" that are feeling the combined impact of climate change and farming.

With swathes of the Upper Tana River basin's forests and wetlands being converted to agriculture and quarrying over the last few decades, deforestation, open dirt roads, and upstream farming activities on unprotected slopes have led to massive erosion and the deteriorating health of the watershed. Now, as rain falls on farms and other cleared land, soil is washed into the rivers, reducing land productivity for farmers. These sedimentary deposits clog up reservoirs and push up the cost of water treatment and electricity generation.

Nairobi's water treatment and distribution facilities have become choked with sediment, often disrupting water services in the city for days at a time. Today, 60 percent of Nairobi's residents do not have access to a reliable water supply, forcing many people to buy overpriced water from unlicensed vendors just to have the bare minimum to drink, cook and wash. The situation will become more acute as Nairobi's rising population requires the Upper Tana basin to provide more food, water and electricity. Demand for water has risen by 250 percent since 2004.

In 2013, The Nature Conservancy (TNC) began work to develop the Upper Tana-Nairobi Water Fund to restore and protect the Tana River and improve Nairobi's water security. Creating water funds is a global TNC initiative that enables public and private downstream water users to jointly invest in upstream land conservation in order to secure improved water quality and to regulate water supply.

The funds provide a mechanism to compensate upstream users for activities that deliver benefits throughout the catchment, and investors – including utilities, large businesses and government agencies – are increasingly viewing them as a smart way to minimize treatment costs



and reduce future water shortage risks. Since 2000, TNC has helped establish more than 30 water funds, serving 50 million people worldwide, and has several more in the pipeline.

The Upper Tana-Nairobi Water Fund was launched in March 2015. Its objective is to create a US\$ 15 million endowment fund dedicated to reducing erosion and improving water quality in the Tana River, safeguarding Nairobi's principal source of water, and enhancing the livelihoods of rural people in the Upper Tana basin through sustainable land management. The Fund is structured to include both a "revolving fund" to be spent directly on conservation projects, and an endowment to generate interest and provide long-term stability.

By 2025, the Nairobi Water Fund aims to achieve the following:

- 30 percent drop in water supply interruptions;
- 50 percent cost reduction for hydro-electricity production and water treatment;
- 15 percent more water in dry season flows;
- 30 percent increase in farm income via improved irrigation and soil productivity;
- 10,000 hectares reforested;
- 100 km<sup>2</sup> of riparian land restored;
- 2 million trees planted;
- 1.6 million tonnes of carbon sequestered.

After just two years, the Nairobi Water Fund is already working directly with 15,000 farmers and reaching a further 25,000; it has established sustainable management on 48,562 hectares of land, and is planting 175,000 trees a year.



Over 6,000 farmers are working to reduce the water withdrawn from the river for irrigation. Stanley Kaminju has installed a water pan to harvest rainwater from his roof. © TNC

## WHAT'S NEW?

Water funds are not new for TNC, but they are new for Africa, and the Nairobi Water Fund is the first of its kind on the continent. Like all TNC water funds, it is founded on the principle that it is cheaper to prevent water problems at the source than to address them downstream. Cities can improve their water by investing in nature-based solutions within catchments that protect water long before it reaches their outskirts. Thanks to the Fund, watershed restoration is now seen as a sound, long-term investment by local authorities, utilities and companies in Nairobi – all of which rely on the Tana River.

According to a comprehensive business case, over a 30-year period "Fund-led" soil and water improvements in the Upper Tana basin will lead to more than two US dollars in benefits for every one US dollar invested, including gains for Nairobi's water and sewerage company and US\$ 3 million a year in increased yields for farmers. Under this pioneering initiative, landowners and NGOs are working upstream to protect the watershed and harness nature's ability to capture, filter, store and deliver clean and reliable water.

Activities, including terracing to redirect run-off, and capture the sediments, installing drip irrigation systems, and planting trees and napier grass to stabilize the soil, all contribute to strengthening water, power and food security in the Nairobi region, a crucial economic hub for Kenya and the entire East Africa region.

## WHAT CHANGES DO WE WANT TO SEE IN THE WORLD BECAUSE OF THIS PROJECT?

The success of the Upper Tana-Nairobi Water Fund will serve as a model for other African cities and countries facing similar challenges in the face of water scarcity, population growth and climate change. It's an opportunity for Nairobi to establish itself as a trail-blazing city in the use of innovative financial mechanisms to protect and restore watersheds.

Worldwide, the cost of land degradation amounts to nearly US\$ 300 billion. As with other severe environmental and economic problems, TNC is convinced that the best way to tackle this threat is through government agencies, the private sector, communities, and conservation scientists all working together. The Water Fund model provides a vehicle for investing in the protection of ecosystem services that benefit farmers, the environment and businesses, and the Nairobi Water Fund is proving that the model can be adapted to meet the demands of a dynamic African capital. Achieving water security is one of the global Sustainable Development Goals, and a growing challenge in much of Africa as climate change leads to less water in dry seasons and heavier deluges in rainy seasons. This is further exacerbated by population growth reducing the amount of water available per capita.

## HOW DOES THIS PROJECT CONTRIBUTE TO THE TNC AFRICA VISION OF A FOOD-SECURE AND PROSPEROUS CONTINENT THAT VALUES NATURE?

The Upper Tana watershed supplies water to a million farms in one of Kenya's most agriculturally productive regions, and its decline is undermining food security throughout the country. Through our partners in the Upper Tana-Nairobi Water Fund, 15,000 farmers are already helping to reverse this decline by taking small but significant steps to lessen the myriad problems caused by deforestation and massive sediment run-off. These efforts are reducing water treatment costs for utilities and companies, increasing dry season flows and improving crop yields, demonstrating the mutual benefits to be gained by restoring nature. It is not surprising that the Government of Kenya has declared the Fund a national priority.

Farmers are becoming active participants in water conservation and seeing their lives transformed. Among a wide range of activities, they are learning to dig trenches and plant napier grass to prevent soil run-off, and receiving support to install water pans to harvest and store rainwater, allowing them to grow and sell vegetables during the dry season when they fetch a higher price. More than 6,000 farmers are working to reduce the amount of water withdrawn from the river for irrigation, leaving more available for urban users and power generation downstream.

The benefits of the Water Fund are already clear. Water delivery interruptions caused by sediment spikes have been reduced by 30 percent compared to 2013, and there is 18 percent less annual sedimentation in the Masinga reservoir.

*“There was a time when I almost lost my house. Heavy rains would rush down the hillside and take the soil with it. I dug holes and built two walls, but it didn't work. I needed to save my house. Now I am making terraces the right way and planting napier grass and bamboo to prevent erosion. It's helping me control water running to the river. My farm is becoming more stable. Touching the soil, I feel like I'm touching life. You can't grow food without soil. I don't want it to just wash away and contaminate the water.”* Jane Kabugi, Upper Tana basin farmer

## WHAT ADDITIONAL BENEFITS ARE LIKELY AS A RESULT OF INTERVENTION IN THIS AREA?

With Nairobi contributing 60 percent of Kenya's GDP, the Tana River fuels the nation's economic growth. By helping to secure a healthy watershed able to provide the city with a reliable, safe water supply – not to mention hydropower and more productive farming – the Upper Tana-Nairobi Water Fund is a key component in allowing Nairobi and its millions of residents to thrive in the future.

More than half a million people in the watershed depend on local stream water for their basic needs. The conservation work supported by the Water Fund may also provide significant benefits to the wider ecosystem and the wildlife it supports. The Tana River sustains the globally important Tana Delta Ramsar site.

## WHO ARE THE MAIN ACTORS?

The Upper Tana-Nairobi Water Fund was made possible by NGOs, public utilities, companies and private investors coming together and committing to making watershed conservation a priority. It is governed by a trust and managed by a Board of Management which represents the public and private organizations that spearheaded the Fund.

Current partners of and investors in the Water Fund are: TNC; the Government of Kenya; Nairobi City Water & Sewerage Company (NCWSC); Kenya Electricity Generating Company (KenGen); Tana & Athi Rivers Development Authority (TARDA); Pentair Inc; The Coca-Cola Africa Foundation (TCCAF); East Africa Breweries Ltd; the International Centre for Tropical Agriculture (CIAT); Water Resources Management Authority (WRMA); Frigoken Kenya Ltd of the Aga Khan Development Network; the International Fund for Agriculture (IFAD); the Global Environment Facility (GEF); and the World Agroforestry Centre (ICRAF).



Jane Kabugi has learned how to dig trenches and plant napier grass to prevent soil run-off. © Nick Hall/TNC



## WHAT NOW?

The success of the Nairobi Water Fund will depend on expanding public and private financial support to capitalize a US\$ 15 million endowment that will enable soil- and water-saving actions to continue in the long-term and over an expanded area.


As the Fund grows, it is even more important to monitor its impact. The Water Fund's research partner, CIAT, has already produced data and digitized maps to guide investment decisions and provide a baseline to evaluate future results. For example, it has modeled current land use against potential land use changes, such as shifting from horticulture to coffee, and predicted the impact on soil erosion and water sediment. CIAT will continue to evaluate land management options – such as measuring the effectiveness of terracing and grass strips – so that they can be

tailored to specific areas of the watershed. To help this process, automatic data recorders at monitoring sites along the river will measure sediment and flow levels, providing a continuous stream of data to assist with evaluation.

On a wider scale, TNC's recently published *Sub-Saharan Africa Urban Water Blueprint* identifies 28 cities that could improve their water security by investing in watershed conservation, potentially benefiting more than 80 million people. Using experience gained from the Nairobi Water Fund, and data collected for the Blueprint, TNC is currently responding to local requests to help create Africa's second water fund, in Cape Town, South Africa.

## WHAT'S OUR DREAM HEADLINE?

*“Clean water, healthy land and better crops – Nairobi leads the way”*



**“Ninety-eight percent of our raw material is water, so we have a huge responsibility to participate in water conservation. This business will only be sustainable if we can maintain a reliable and sustainable source of water not only for industrial use but also for domestic use by consumers living along the chain.”**

Bob Okello, Public Affairs Director of Coca-Cola East Africa

A young man picking tea leaves on a tea plantation in the Upper Tana Watershed, Kenya. © Nick Hall/TNC

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## FURTHER INFORMATION

These factsheets are part of a global series highlighting TNC's work around the world to improve agricultural practices as demand for food and land increases.

The Nature Conservancy is a global conservation organization dedicated to conserving the lands and waters on which all life depends. Guided by science, we create innovative, on-the-ground solutions to our world's toughest challenges so that nature and people can thrive together. We are tackling climate change, conserving lands, waters and oceans at unprecedented scale, and helping make cities more sustainable. Working in more than 65 countries, we use a collaborative approach that engages local communities, governments, the private sector, and other partners. To learn more, visit [www.nature.org](http://www.nature.org) or follow @nature\_press on Twitter.





## The Southern Agricultural Growth Corridor Laying the Foundation for Smart Planning for Sustainable Agriculture in Tanzania

Tea Out growers harvesting tea at the Unilever Tea Farm in Mufindi, Iringa. @SAGCOT and Partners

**T**he Southern Agricultural Growth Corridor of Tanzania (SAGCOT) runs from Dar es Salaam, down Tanzania's central rail, road and power backbone, to the borders with Zambia and Malawi. Spanning about one-third of the country, and containing some of its most fertile lands, extensive forests and reliable water resources, it is an area on the cusp of major agricultural growth, facing huge opportunities and critical risks.

TNC has been leading two initiatives in the SAGCOT region. The **SNAPP: Science for Nature and People Partnership for SAGCOT** was a two-year collaboration, from January 2015 to December 2016, aimed at generating practical decision support tools to help policy-makers and investors avoid risks and guide sustainable agriculture intensification throughout the corridor. Implemented during the same period, our other project was supported by the Consultative Group on International Agricultural Research – **Water, Land and Ecosystem (WLE)** program and focused on laying the foundations for effective landscape planning in

the Ithemi Cluster area of SAGCOT through workshops and investigations into socio-economics and hydrology, and gender equity. The timing and location of these initiatives are crucial. In 2009, Tanzania embarked on a national Agriculture First – or *Kilimo Kwanza* – strategy to meet the needs of a rapidly growing, and more aspirational, population. SAGCOT – a public-private partnership launched in 2010 with the aim of boosting agriculture and integrating small-scale farmers into value chains in the fertile corridor known as the food basket of Tanzania – is a key component of this national plan.

The opportunities are immense. Tanzania's huge agricultural potential is largely unrealized and the government knows that it will not be possible to ensure food security and achieve sustainable development without a transformation in farming. But, the risks are equally daunting. Decisions and investments are being made with insufficient attention to natural landscapes and social inclusivity.

SAGCOT is also one of the most important wildlife corridors in East Africa, and faces mounting pressure and uncertainty due to climate change. It is essential that the *Kilimo Kwanza* strategy puts not only agriculture, but also the longer term needs of communities and nature, at the forefront of **Smart Planning**.

Which is where TNC’s work comes in. In 2012, the government officially committed to a SAGCOT “Greenprint” to steer the “greening” of agricultural investment, but the strong base-line data required to deliver this wasn’t there. It was also clear that the rapidly evolving technologies of mapping and spatial analysis could paint a clearer picture of the pressures on the landscape. By consulting local managers and farmers, we identified the three areas where scientific evidence and support is most urgently needed:

- SUSTAINABLE LAND USE – focused on crop suitability, land use/cover and soil analysis, and biodiversity mapping;
- SUSTAINABLE WATER FLOWS – focused on catchments, hydrological modelling, and climate change;
- BEST PRACTICE FOR INVESTORS – focused on environmental and social inclusivity investor guidelines.

By producing detailed assessments and practical decision support tools in these three critical areas, the SNAPP and WLE interventions are helping policy-makers, investors and local institutions choose the best locations, plant the best crops, and use the best farming practices to realize this land’s full potential.

### WHAT’S NEW?

Speed and science do not always go together, but in this case they had to. Taking five years to fill these knowledge gaps would have been too long; the chance to steer Tanzania’s farming transformation towards sustainable, inclusive, agriculture intensification would be missed.

Luckily, the SNAPP Vision is: *A Quick, Clear Pathway to*

**Impact.** It uses multi-disciplinary Working Groups – teams of scientists, practitioners and stakeholders – to deliver rapid results. This does not mean cutting corners, but finding out what is most needed and focusing on delivering it, fast.

SNAPP is designed to be targeted, multi-dimensional, responsive and results-driven. In this case, three Working Groups were formed to carry out deep investigations into the land and resources, engage with smallholders and other local stakeholders, and identify future trends and risks in the three key areas. Our work helps the government’s SAGCOT Centre to take on the role of neutral broker and information hub, armed with the knowledge needed to negotiate with investors.

### WHAT CHANGES DO WE WANT TO SEE IN THE WORLD BECAUSE OF THIS INTERVENTION?

Decision-makers are more responsive to scientific advice if it is clear, practical and targeted at providing the information needed for their specific program, and recognizes the real budgetary and time constraints they face. Experts can make more of an impact if they join the process early, present alternative solutions, and show both the evidence behind them and the benefits to be gained.

In countries like Tanzania, where development needs are acute and where governments have expressed good intentions to follow a sustainable path, scientists have a chance to play a key role in shaping the future. The SNAPP and WLE projects show that by producing useful, evidence-based tools – when they’re needed – experts can be agents of positive change. We want to see more scientists, governments and investors working together in positive, constructive ways that achieve results.



Fig. 1 Tanzania, showing SAGCOT Corridor and Ithemi Cluster.





A primary concern is to ensure that wildlife movement corridors remain intact by steering agricultural development to suitable lands. © TNC

## HOW DOES THIS PROJECT CONTRIBUTE TO THE TNC AFRICA VISION OF A FOOD-SECURE AND PROSPEROUS CONTINENT THAT VALUES NATURE?

Land use and land cover are changing rapidly across Africa, as populations grow and with the impact of climate change. Investing in sustainable agriculture intensification will help achieve the goal of producing more food with less impact on the environment, while building resilience and ensuring the natural resource base is sustained for future generations. The SNAPP and WLE projects are models for how scientists, and other experts and practitioners, can become agents of change towards achieving this goal.

The decision support tools TNC produced are highly practical, and respond directly to the concerns of local stakeholders. We created **crop suitability maps** based on an evaluation of 23 common crops; **hydrological models**; an online interactive mapping tool showing **agricultural constraints and opportunities**; **gender inclusivity tools**; and an **Environmental and Social Performance Investment Screen** designed for use by SAGCOT in its early exchanges with investors. These can help position agriculture intensification in the most productive areas, where constraints are lower, and guide crop and livestock choices with the best chances of success. They also point out relatively simple solutions, like correcting soil acidity, and can help limit the need for irrigation in favor of rain-fed agriculture. This information is useful for both smallholder farmers and big agri-business, in the

SAGCOT region and beyond, especially in Africa's other development corridors.

Africa needs to grow more food, and in countries like Tanzania – where only 24% of arable land is currently in use – this will mean expanding the agricultural footprint. Projects like SNAPP can help ensure that this expansion is concentrated where it will be most effective and inclusive, maximizing food production while protecting the continent's precious natural heritage.

## WHAT ADDITIONAL BENEFITS ARE LIKELY AS A RESULT OF INTERVENTION IN THIS AREA?

Pointing the way towards productivity gains on the most suitable land will reduce the pressure to extend agriculture into marginal and protected areas. This will help conserve water and forest resources, and avoid encroachment into the wildlife conservation areas and corridors so essential to Tanzania's biodiversity and tourism industry.

As investment in farming increases under *Kilimo Kwanza*, we hope more people will be active in the decisions which affect a sector that employs 80% of the nation's workforce. By helping to create an enabling environment for inclusive, sustainable agriculture, the project will not only help attract responsible private investors, but also encourage more women, smallholder farmers (many of whom are women), youth and other groups to become excited about agriculture intensification.

## WHO ARE THE MAIN ACTORS?

The SNAPP and WLE projects are collaborations between The Nature Conservancy's Africa Regional Program, the International Center for Tropical Agriculture (CIAT), and Sokoine University of Agriculture in Morogor. Other key partners include the Wildlife Conservation Society, WWF, IUCN, and SAGCOT Centre Ltd, which coordinates investments in the SAGCOT region and is a keen supporter of the project.

## WHAT NOW?

Success now depends on the uptake of the decision-support tools by planners, investors and other stakeholders. A TNC technical expert is refining the products into more practical, useable forms, and working closely with the SAGCOT Centre to design a dissemination strategy for getting these tools to target users. A monitoring system is being embedded in the strategy to assess progress on the adoption and impact of the project's outputs.

Simultaneously, TNC will be coordinating an extensive stakeholder validation exercise for the land use and hydrological models, including field surveys. Now that these

tools have been created, it's time to make sure they start driving agricultural Smart Planning.

## WHAT'S OUR DREAM HEADLINE?

*"Tanzania celebrates world's first truly Green Revolution: hunger eliminated, wildlife flourishing, thanks to Smart Planning"*

## NEXT STEPS

TNC is looking for resources to embed a data manager into SAGCOT to help the Tanzanian government bring the best science into its planning in the corridor, and to build out the TNC science team in-region to enable us to promote responsible land-use planning, especially around developing decision support systems. The SAGCOT Centre is at the intersection of many processes, and in a key position to mobilize and accelerate sustainable agricultural growth; our team can contribute science, strong logic, and pragmatism to assist. Priorities for the TNC data manager and science team over the next three years include improving crop suitability modeling, carrying-out explicit mapping of the whole SAGCOT region into "go" and "no-go" zones, and the development of integrated screening tools to guide investors.

**"Performance payoffs for intensification in the most suitable areas are extraordinary. For the important traditional maize crop, farm yields in the SAGCOT region could potentially increase tenfold to 10 mt/ha. The SNAPP project brings science, strong logic, and pragmatism to help achieve this."** Felix Kamau, TNC



One of Unilever's Tea Farms in Mufindi Iringa. @SAGCOT and Partners

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## Sustainable production in Brazil

### Collaboration to conserve forests and enhance livelihoods

Lucas do Rio Verde, Mato Grosso. © Rui Rezende

**B**razil is home to about one-third of the world's remaining rainforest and is the most biodiverse country on Earth. It is also a major global food basket, one of the world's top three exporters of both beef and soy, and is heavily reliant on these commodities as a source of income and employment. However, extensive ranching and agriculture are leading to massive deforestation in many parts of the country, which saw over 8,000 km<sup>2</sup> of its share of the Amazon forest cut down in 2016, an increase of 29 percent over the previous year. About 20 percent of the forest has already disappeared.

Clearing the forest for cattle, crops, roads and settlements had been standard practice for decades, and even actively encouraged by government authorities, despite the efforts of part of Brazilian society to stop it. In the 1990s and the 2000s, the rate at which the Amazon was disappearing peaked so much that it caught the attention of national and international public opinion. Pressure swiftly mounted, helping to trigger a dramatic policy shift in Brazil toward encouraging sustainable development and reversing the destruction of the Amazon.

The Nature Conservancy (TNC) has been actively contributing to curbing deforestation in Brazil for over ten years, primarily by working to promote responsible food supply chains and helping farmers to make their land more productive. Sustainable food production is a priority for TNC in the country, with much of our work concentrated in two of Brazil's Amazonian states, **Pará** and **Mato Grosso**.

One of TNC's first conservation successes in Brazil began in 2004 with a project aimed at supporting the implementation of Brazil's Forest Code in the soy-producing Pará municipality of **Santarém**. First passed in 1965, the Forest Code requires Amazon landowners to maintain 50–80 percent of their land under native vegetation, but for decades it had proved impossible to enforce as the vast majority of land lacked ownership records, and authorities lacked the resources to monitor properties. To help solve this challenge, TNC partnered with Cargill to develop a system that would become a major inspiration for the **Rural Environmental Registry** (*Cadastro Ambiental Rural*, known as CAR), and made compulsory by the Brazilian government in 2012, when the Forest Code was revised.



Using satellite images and GPS information, TNC and Cargill built a baseline mapping system covering more than 300 soy-producing properties in Santarém and used it to monitor changes in the forest coverage. This allowed TNC to create a “green list” of farmers that do not clear forest to open new areas for soy fields. Since 2004, Cargill has relied on this sustainable soy green list to fulfil its pledge to only buy soy from farmers meeting progress towards compliance with the Forest Code, providing a strong incentive for farmers to not clear forest to grow more soy. Illegal deforestation in the properties fell to almost zero, helping to spearhead the spread of industry commitments and the central role of the land registry to permit individual property accountability.

In 2006, TNC started working with key actors from the public and private sectors, such as Syngenta, IDH, Amaggi and Fiagril, to develop a similar system with soy producers in the state of Mato Grosso, to conserve the Cerrado (tropical savannah) in municipalities such as Lucas do Rio Verde and Sorriso, two of Brazil’s soy capitals. TNC, companies and the local authorities developed a comprehensive mapping system to help farmers plan their production and enable governments to sharpen their monitoring capacity. Bunge and Cargill also joined the efforts in the region.

The positive outcomes in Santarém and in Mato Grosso meant that TNC was soon reaching additional districts. In 2009, a few months after the Brazilian government had created a “blacklist” of municipalities and blocked financial credit to those with high levels of deforestation, TNC started working in Paragominas in Pará state, which is now regarded as a test-case for transforming a region from environmental pariah to sustainability pioneer. Having been declared one of the worst places for deforestation in Brazil in 2008, and denied access to government credit, by 2010 Paragominas had become the first municipality to be removed from the blacklist. Five years later, it had reduced deforestation to less than 25 km<sup>2</sup> per year – down from 333 km<sup>2</sup> in 2004 – and become a template for the “Green Municipalities” initiative that was launched across the entire state of Pará in 2011.

In parallel with the work in Paragominas, TNC accepted an even more daunting challenge: to use our experience with CAR to help Brazil’s top deforester São Félix do Xingu in the state of Pará. This Portugal-sized beef producing municipality hosts the largest cattle herd in the country, and was losing its forest to unplanned ranching expansion at an alarming rate. Even protected Indigenous Lands and conservation areas in the region were not safe. TNC and partners worked to get more land included under CAR and to develop alternatives



Cut tree in São Félix do Xingu, in the Brazilian Amazon. © Rafael Araujo

to the totally unsustainable model of production. Reducing deforestation was just one side of the equation. The other was helping landowners make the land they had already cleared more productive by sustainably intensifying production through better husbandry practices, such as rotational grazing that allows ranchers to keep more cattle per acre.

*1,407 km<sup>2</sup> of deforested area in 2005 down to 151 km<sup>2</sup> by 2014*

As part of this effort, TNC is leading a Sustainable Beef: From Farm to Table initiative, originally developed as a pilot project that increased productivity by more than 50 percent and includes commitments to maintain zero illegal deforestation in 16 properties. The initiative has since expanded massively to involve one of the world’s largest food producers, the meat company Marfrig, and the world’s leading food retailer Walmart, with the support of the Gordon and Betty Moore Foundation. Together with TNC, these companies have adopted improved policies and tools to monitor deforestation on their suppliers’ properties, such as an enhanced beef tracking system, that allow them to offer Brazilian consumers the option to buy beef from a verified deforestation-free source.

Another component of our work in São Félix do Xingu is the Cocoa Forest Initiative, through which TNC helps small farmers plant cocoa and other native trees in lands degraded by ranching, so that the farmers recover the forest, adhere to the Forest Code, and improve their livelihoods at the same time. In partnership with Cargill, TNC is developing sustainable cocoa planting with 100 local farmers. Their motto is: *“The cocoa is for us, the trees are for our grandchildren.”*



TNC's goal is to reduce deforestation by 97 percent, to remove São Félix do Xingu from the blacklist, and provide an inspirational model for sustainable beef production and economic development in the Amazon. Since 2005, rates of deforestation in Brazil have decreased dramatically – by 80 percent below historical rates, thanks to improvements to national forest law and actions like those we have taken in the Pará and Mato Grosso states. To date, TNC has worked to implement CAR in 12 municipalities across the two states, which became even more important after the Forest Code was revised in 2012, since one of the key criteria for removal from the dreaded blacklist is to register at least 80 percent of private land in CAR.

There is much more to be done. In the last two years, deforestation rates have jumped again. Brazil has been slow to follow up on implementation of its new Forest Code and the political and economic crisis has sent mixed signals on commitment to deforestation control. Making the business case for deforestation-free production, coupled with a strong market and government signals that deforestation is not accepted, needs a concerted effort. TNC, the World Wide Fund for Nature (WWF), National Wildlife Federation (NWF) and the Gordon and Betty Moore Foundation have joined forces with other strategic partners to lead a multi-institutional effort, the Collaboration for Forests and Agriculture, to align market forces in pursuit of zero deforestation in soy and beef supply chains, not only in the Brazilian Amazon and Cerrado but also in the next most threatened biome in Latin America, the Gran Chaco of Paraguay and Argentina.

*“It is through TNC that we have the technical support to farm the right way. This is very important to us. We are contributing to the preservation of nature and generating income.”*  
Benício Mariano Dutra, cattle rancher, São Félix do Xingu.

## WHAT'S NEW HERE?

The Brazilian Amazon epitomizes the potential of the new, collaborative “green growth” story. The massive scale of the forest, the devastation that was being wrought by its destruction, and the lack of information and tools available to stakeholders, was overcome by genuine political will, partnerships between sectors, and rising public engagement from the local to global level. TNC has witnessed, and been proud to play a role in, this remarkable transformation to save the Earth's greatest rainforest.

What has been achieved in São Félix do Xingu and Paragominas shows that nothing is impossible. Just ten years ago, these municipalities were symbols of frontiers out of control, losing thousands of km<sup>2</sup> of forest every year, and with ranchers and farmers facing draconian measures to stop deforestation leading to riots and conflict. In each case, solutions were found thanks to the emergence of coalitions of dedicated people from across sectoral divides.

*TNC's goal is to reduce deforestation by 97%, to remove São Félix do Xingu from the blacklist, and provide an inspirational model for sustainable beef production and economic development in the Amazon*

In Paragominas, the coalition included a highly committed mayor, merchants, farmers, ranchers, soy producers, a union leader who organized farmers to get registered on the CAR,



Transport of cattle, Para to Maranhao. ©Henrique Manreza

merchants, and NGOs like TNC helping with mapping and other tools. This led to the signing of a local **Pact Against Deforestation** and the acceptance of the new environmental model called “Zero Deforestation”. Likewise, in São Félix do Xingu, a **Pact for the End of Illegal Deforestation** was signed in 2011 by more than 40 entities, including local, state and national governments, producer unions, community associations and NGOs. The state-wide Pará Green Municipalities Program was also inspired by, and seeks to emulate, these examples of local pacts and partnerships.

Driving positive change through strong alliances and by monitoring deforestation, as well as providing incentives, can lead to win-win outcomes for everybody. New tools are now encouraging ranchers and farmers to improve and restore the health of their holdings. Added to this, a land registry project is showing where the most work still needs to be done. Efforts are also underway to develop productive local economies that will keep forests intact while allowing residents to make a better living.

*What has been achieved in São Félix do Xingu and Paragominas shows that nothing is impossible*

#### **WHAT CHANGES DO WE WANT TO SEE IN THE WORLD BECAUSE OF THIS PROJECT?**

Promoting sustainable farming in the Amazon is as much about development as it is about conservation. Millions of people live, farm and work in and around the Brazilian rainforest and Cerrado; these areas cannot become untouchable ecological sanctuaries where economic activities are banished. TNC’s approach is to welcome business as part of the solution, working alongside local authorities, community groups, scientists and producers. Our partnerships with large companies allow us to scale up our impact to reach far more people. In fact, bringing the private sector, government and farmers together is essential



Maize crop cultivated between soy harvests in Lucas do Rio Verde. ©Erik Lopes/TNC



if we are to operate at the scale needed to stop deforestation and restore the Amazon.

TNC supports private companies to set up – and honor – strong deforestation commitments in their supply chains. Farmers, in turn, can benefit from lucrative, reliable markets, and the resources, expertise and tools that these companies bring. As well as the direct contributions that our Amazonian projects are making towards reducing deforestation, a wider change TNC would want to see is a renewed faith that it is possible for economic development, community empowerment and environmental protection to all work hand in hand, and that – since farming is a business – we need to engage business in the development of sustainable, collaborative farming solutions.

### **HOW DOES THIS PROJECT CONTRIBUTE TO “FREEZING THE AGRICULTURAL FOOTPRINT OF EXPANDED LAND USE”?**

In the next decades, Brazil has the unique opportunity to double its food production without habitat loss, through combined efforts to increase productivity in its rural areas and reforest them with native trees. Farmers and ranchers can free up pasture for grains where the land is suitable, and produce more pasture on the remaining ranch land by improving soil conditions and adopting other simple management techniques. This could be a major gain for people and for conservation, and even ignite global change in our food supply chain.

Results are already highly encouraging. Beef producers who joined a local sustainable beef association in São Félix do Xingu saw cattle density nearly triple in just two years. In some cases, this allowed them to divide their land into smaller pastures, which then allowed them to rotate the animals and get greater grass growth on the farm, or to rent some out to other ranchers for grazing, earning twice as much from the same area of land – and without cutting down any trees.

Degraded land can also be restored to native forest through ecological success and planting trees or put back into productive use through soil remediation. TNC is also working with farmers to plant sustainable agroforests of cocoa trees, banana trees and a mix of native hardwood to help restore the rainforest, while providing a better livelihood. As an added bonus, these agroforests of native species count as replanted forests contributing to Brazil’s

commitment to restore forests to mitigate climate change. TNC is also teaching practices that improve soil conditions for cattle ranching and in turn stop the deforestation cycle.

The sustainable intensification of already developed areas, and the introduction of economic alternatives to maximize the benefits of farming activities while maintaining the forested portions of the land, all lead to less forest being removed and more stable, diversified sources of income and employment. If these solutions were extended across Brazil, its neighboring countries, and beyond, the positive effects on both global food production and habitat conservation could be truly staggering.

### **WHAT ADDITIONAL BENEFITS ARE LIKELY AS A RESULT OF INTERVENTION IN THIS AREA?**

Whatever happens in the Amazon Basin has global repercussions – for better or worse. About 50 percent of Brazil’s greenhouse gas emissions come from the destruction of its forests, making it one of the world’s top emitters, just behind the USA, China and Indonesia. Now that Brazil has pledged to slow deforestation by 80 percent and reduce emissions by at least 36 percent by 2020, demonstrating change in places like São Félix and Paragominas is even more important. If we are able to reverse the deforestation crisis in Brazil’s two emblematic municipalities, it proves that the problem is solvable anywhere. That is good news for the entire world.



Farmer working on his rural property in São Félix do Xingu, in the Brazilian Amazon. © Erik Lopes/TNC

## WHO ARE THE MAIN ACTORS?

TNC is fortunate to work with a wide range of dedicated partners, including: federal, state and municipal government agencies; stakeholder groups such as the Association of Family Farmers of Alto Xingu, the Rural Workers' Union and the Rural Ranchers' Union; NGOs like Casa Familiar Rural, the Brazilian Biodiversity Fund, Imazon, and Instituto Centro de Vida; and corporate partners such as Marfrig, Cargill, Walmart and Bunge.

## WHAT NOW?

Across Brazil, more than 4 million farms have been registered in CAR, covering the vast majority of the private rural areas in the country. A major challenge, now, is to support farmers and ranchers to increase productivity and reforest the parts of their properties that need to be restored, according to the Forest Code. Authorities also need to be more effective in using CAR to fine those owners

who illegally deforest their lands, while the private sector needs to increase its commitment with sustainable sourcing of food supplies.

TNC is working with the governments of Mato Grosso and Pará to help them develop their Environmental regularization programs that will enable farms to become compliant with the Forest Code in their forest conservation either on-farm or through compensation mechanisms. TNC aims to work in the south-east of Pará, the center of Amazon beef production, in the Araguaia Valley in north-east Mato Grosso, an Amazon transition to Cerrado region with cattle and soy, and in the Alto Teles Pires basin, center of soy production in Mato Grosso.

TNC has begun working with individual municipalities, as well as with the Pará Green Municipalities Program, to develop “post-CAR” strategies for expanding production



Xingu river's margin, in the Brazilian Amazon. © Rafael Araujo



and further improving rural livelihoods. One encouraging development in this direction was the announcement by the Pará state government in 2016 that it was officially adopting our cocoa tree planting initiative in São Félix as the reference for a state policy to expand cocoa as a tool for reforestation in degraded lands throughout Pará.

Back on familiar terrain, TNC is a lead NGO partner of the new Pará 2030 economic development agenda, which seeks to spur economic growth and social development while achieving net zero deforestation by 2020. Sustainable intensification is an opportunity to grow the cattle industry while also meeting environmental goals; this has proven able to more than triple ranch productivity while creating incentives for reforestation and forest protection.

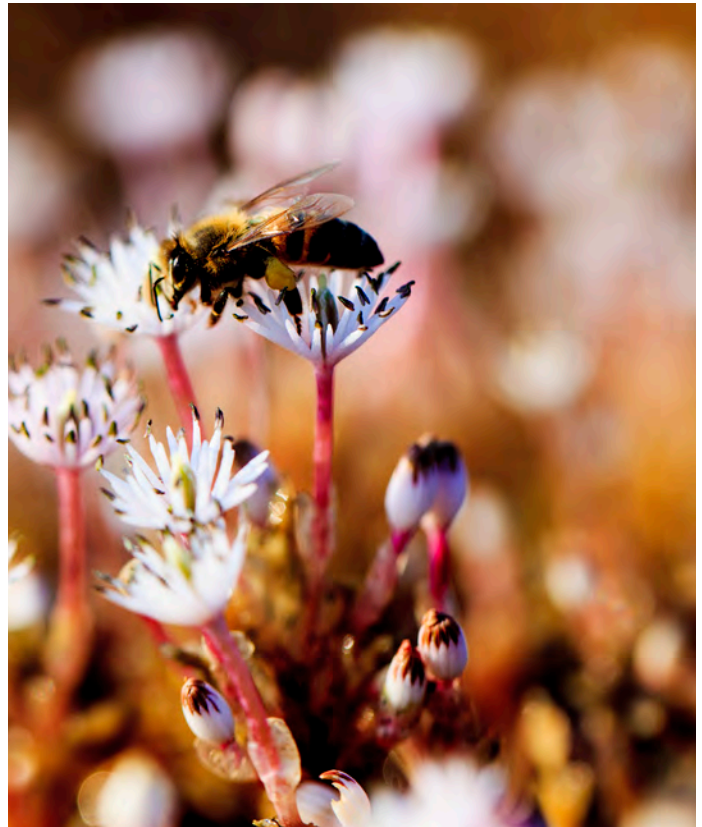
Pará 2030's goal is for cattle production in the state to increase by 50 percent by 2030 with no new deforestation, and to restore more than 400 km<sup>2</sup> of forest and protect over 2,000 km<sup>2</sup>, leading to a reduction in emissions of a billion tons of CO<sub>2</sub>e. The first task will be to identify and adapt new investment models able to support this sustainable intensification, and to test them in a pilot in the São Félix region.

TNC is also a key partner in a similar initiative by the state of Mato Grosso called Produce, Conserve, Include (PCI), which provides an official framework for civil society, government, the private sector, and donors and investors to work collaboratively to conciliate production, conservation and social inclusion.

## **BRAZIL IN GLOBAL CONTEXT**

Brazil's importance to conservation at a global level is reflected by the effort TNC makes to ensure that Brazilian concerns and interests are reflected globally, so that other countries can learn from the Brazilian experience. In 2014 many companies signed the UN Declaration on Forests and Climate, committing themselves to eliminating deforestation from beef, soy, palm oil and pulp/paper supply chains by 2020. Since Brazil is among the world's biggest producers of beef and soy, it is a critical country for implementing those commitments. TNC, with its long history in Brazil of partnerships with the private sector and working on deforestation issues along commodity supply chains, is uniquely positioned to advance this agenda.

In 2016, TNC helped design and launch the Collaboration for Forests and Agriculture (CFA), a joint effort with the



Bee in São Félix do Xingu, in the Brazilian Amazon. © Rafael Araujo

National Wildlife Federation (NWF), World Wide Fund for Nature (WWF), and many other strategic partners, funded by the Gordon and Betty Moore Foundation. It focuses on eliminating deforestation from beef and soy supply chains in the Brazilian Amazon, the Cerrado, and the Argentinian and Paraguayan Chaco. This complements the work we have been doing at municipal and state level in Brazil, scaling up the impact of the successful projects in Mato Grosso, Santarém and São Félix do Xingu through a market-based approach. Our office in Sao Paulo hosts the Latin America representative of the Tropical Forest Alliance, a global association of companies committed to reducing deforestation along their tropical supply chains.

TNC has also played a central role in designing and launching the Accountability Framework, a multi-NGO initiative including WWF, Greenpeace, the Alliance for Forest Peoples, and others. Ever since the UN Declaration on Forests and Climate, a major problem in implementing deforestation commitments has been a lack of agreed definitions and standards for measuring progress. Companies need to be able to report on progress in implementing a deforestation commitment as if it were a carbon footprint or water use commitment, and are looking




to the environmental community to provide the clarity they need. At present, in selected countries, including Brazil, that can be done, however, there is no global framework for rolling up that national work so that global commitments can be implemented, measured and verified globally. Folding Brazil into that global framework is a vital piece of making sure companies hit that 2020 deadline for the elimination of deforestation from beef and soy supply chains.

#### WHAT'S OUR DREAM HEADLINE?

*“Sustainable intensification from theory to practice. Cattle, soy and the Amazon: how to have your forest, and cows and crops too.”*

#### USEFUL WEBSITES

- [www.tfa2020.org](http://www.tfa2020.org)
- [accountability-framework.org](http://accountability-framework.org)
- [www.moore.org/initiative-strategy-detail?initiativeld=forests-and-agri-cultural-markets-initiative](http://www.moore.org/initiative-strategy-detail?initiativeld=forests-and-agri-cultural-markets-initiative)



*“The jungle at the mountain tops is being preserved and reforested as a way to avoid erosion. We can dream that a few years from now our grandchildren will be able to enjoy this same landscape ... And this is only the beginning. There is a lot that can continue to be done. We wouldn't be the only ones to profit, the entire world would be winning.”*

Solange Reusing, rancher, São Félix do Xingu, Brazil

Protected forest in Sao Félix do Xingu. © Erik Lopes

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#### FURTHER INFORMATION

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## East Kalimantan Green Growth Compact A partnership for prosperity and conservation in the tropical forest

The Nature Conservancy's conservation initiatives in East Kalimantan, Indonesia on the island of Borneo. © Nick Hall/TNC

**E**ast Kalimantan is an Indonesian province on the island of Borneo covering an area just under 50,000 square miles (129,000 square kilometers). One of Indonesia's wealthiest provinces, both ecologically and economically, it contains vast mineral deposits and 18 million acres (7.3 million hectares) of tropical forest. It is home to approximately 3.43 million people, including indigenous Dayak and Kutai, Javanese, Chinese, Banjarese, Bugis and Malay, as well as an estimated 10% of the world's wild orangutan.

Natural resources are immensely important to the region's economy, but East Kalimantan's natural wealth and the well-being of its people are now in jeopardy due to a 30-year legacy of forest loss and degradation caused by unsustainable logging, palm oil production and mining. East Kalimantan has lost a higher proportion of its forests than any other province in Indonesian Borneo.

There have been development gains, but in too many cases forest loss has not brought local economic benefits; in the worst cases it has contributed to widespread fires linked to El Niño events that have impacted indigenous forest communities and eliminated wildlife habitats.

The province has taken steps to transition to a more sustainable, forest-friendly model of development. In 2008, the Provincial Government created its Reducing Emissions from Deforestation and Degradation (REDD+) Working Group and began supporting a range of initiatives at district and project levels. In 2010, the Governor led the launch of the first Green East Kalimantan Strategy and created the Provincial Climate Change Council to drive it forward. Along with Governors from 22 other nations, he signed the "Rio Branco Declaration" to reduce tropical deforestation in 2014.

Recognizing that its ambitious goals demand the province transform its natural resource governance and management on an even larger scale, in May 2016 the Governor of East Kalimantan announced plans to develop a Green Growth Compact. He led a consortium of 19 Compact signatories – from the district government, companies

(oil palm, forestry, and oil and gas), communities and civil society – in signing a joint declaration of intent to develop the Compact by the end of 2017.

**East Kalimantan Green Growth Compact** is centered around two interrelated targets:

- to **reduce deforestation by at least 80% by 2025** and restore enough forest to make up for any remaining deforestation; and
- to **increase economic growth by 8% while reducing emissions by 1,000 tonnes of CO<sub>2</sub>e per US\$ 1 million GDP by 2030.**

The details of the Compact are currently being determined, but action so far includes agreeing to a REDD+ Provincial Strategy and Action Plan, launching a low carbon growth strategy and Action Plan for Reducing Greenhouse Gases, and issuing a moratorium on new licenses for mining, forestry and palm oil. Six logging concessions – covering around 955,000 acres (386,000 hectares) – in East Kalimantan have already made new commitments to achieve international sustainability standards, whereas some have been or are in the process of being certified by the Forest Stewardship Council.

The Nature Conservancy has been working to encourage sustainable forest management by communities and forest concessions in East Kalimantan for more than 15 years through some of our most ambitious forest projects. We are one of the leading NGO partners of the Green Growth Compact.

## WHAT'S NEW?

The Green Growth Compact has sprung from an exceptional combination of factors: acute environmental pressures motivating communities; NGOs and other partners working on the ground to encourage local capacity and engagement; natural resources industries recognizing the damage and hence the need for new approaches; strong and sustained leadership at the provincial level; and the inspiration and support provided by global-level initiatives like REDD+, the Rio Branco Declaration and the Paris Climate Agreement. The province has been selected as Indonesia's only pilot province for the global Forest Carbon Partnership Facility. These driving forces are helping raise the ambition of the Green Growth Compact and elevate East Kalimantan to become a world leader in the transition towards sustainable forest management and low-carbon growth.

One initiative currently encouraging this transition is the Berau Forest Carbon Program (BFCP) – a partnership program amongst governments, communities and the private sector –

in East Kalimantan's Berau District, where TNC has played a major role as a catalyst. BFCP is the only jurisdictionally based REDD+ demonstration activity in Indonesia supported by an NGO. It is the foundation for scaling up our lessons learned to the East Kalimantan provincial level within the Green Growth Compact framework. TNC is translating REDD+ into an on-the-ground incentive mechanism that rewards people for stewarding forests in ways that ensures their survival and retains their stored carbon. We have developed approaches, methodologies and tools to support communities and logging companies in reducing emissions from their daily practices, for example, the "SIGAP" (Communities Inspiring Action for Change) community engagement approach reduces emissions at the community level.

TNC is also working with timber concessionaires to meet national and international standards, and implementing Reduced Impact Logging Practices to Reduce Carbon Emissions (RIL-C), such as developing tools to support sustainable palm oil and incentive mechanisms for RIL-C. In addition, we are supporting the formulation/improvement of policies that advance governance and management of forest and non-forest areas. A key goal of BFCP is to **secure nearly 1 million acres (400,000 hectares) of forested land and watersheds under effective management and protect the habitat of 1,500 orangutan.**

TNC is also active in the development of the prototype initiative the **Essential Ecosystem Area (KEE) for Orangutan in the Wehea-Kelay landscape**, which covers a 760,000-acre (308,000-hectare) corridor. A partnership between government authorities, communities, NGOs, and logging and palm oil companies, this is the first large-scale cross-sectoral collaboration in Indonesia prioritizing the implementation of best land and forest management practices to protect orangutan habitat.



Cautionary road sign to look out for orangutan in the remote Wehea Forest in the eastern Kalimantan region of Borneo. © Bridget Besaw





Carbon monitoring in a teak plantation by the World Agroforestry Centre to determine the carbon load of the entire Berau District. ©Bridget Besaw

## WHAT CHANGES DO WE WANT TO SEE IN THE WORLD BECAUSE OF THIS PROJECT?

East Kalimantan is a microcosm of the world’s sustainable development challenges, and is stepping up to become a pioneer of addressing them through collaboration and leadership – the Green Growth Compact will demonstrate how local-level commitments and partnerships can have a global impact. The province’s sustainable transformation aims to conserve what remains of one of the world’s most biologically rich forests, save the imperilled orangutan, and prevent the release of huge reserves of forest carbon.

We want to see more regions recognizing the value of conserving their natural capital and bringing together broad coalitions of partners able to generate smart, long-term solutions.

## HOW DOES THIS PROJECT CONTRIBUTE TO ‘GREEN DEVELOPMENT’?

By introducing smart land use practices to East Kalimantan, we can keep forest areas productive, building a strong local economy for generations to come while also halting the loss of irreplaceable forest. The Compact partners are planning and testing innovative models of, among others, responsible palm oil and timber production, which could spur forest conservation worldwide.

To shift to a green growth trajectory, East Kalimantan must first address long-standing governance challenges linked to community land tenure, forest concessions, oil palm companies, and spatial planning. Solutions are being pursued through a five-pronged approach:

- **VILLAGE GREEN GROWTH** – including land use and green development plans for community access to forest resources and stronger forest management rights.
- **FOREST MANAGEMENT REFORM** – including the establishment and strengthening of Forest Management Units, and a plan for the pulp and paper sector that identifies areas best – and worst – suited for development.
- **EFFECTIVE CONSERVATION MANAGEMENT** – including forest protection and plantation management, and compensation commitments by palm oil and forestry companies.
- **VISUALIZING SUCCESS** – including contributing to economic growth that helps to increase regional GDP and job opportunities, reduces carbon emissions and enhances human welfare, and securing a greater area of forests under traditional and local community management.
- **SUSTAINABLE PALM OIL** – including a plan identifying areas best suited for development, ensuring company commitments align with government policies and licensing requirements, improving the ability of smallholder farmers to enter larger-scale supply chains, and increasing palm oil yields while reducing plantation areas.

If successful, the Green Growth Compact could inspire similar action and ambition elsewhere in Indonesia, and beyond.

## WHAT ADDITIONAL BENEFITS ARE LIKELY AS A RESULT OF INTERVENTION IN THIS AREA?

The most significant extra benefit will be the protection of the globally important carbon sink provided by the province’s forests, mangroves, and peatlands. Improved forestry and logging practices can reduce emissions by 30 percent without reducing harvest levels. Healthy forests and riparian corridors will also help reduce flooding and sedimentation, and lessen the risk of widespread fires like the ones that engulfed the region in 2015. East Kalimantan’s coral reefs already enable a vibrant ecotourism industry; if developed carefully the tropical forests and their wonderful wildlife could do the same.

## WHO ARE THE MAIN ACTORS?

The Green Growth Compact is co-led by the East Kalimantan Governor and the Ministry of Environment and Forests, in collaboration with committed partners including district/ municipal heads, scientific institutes and universities,



natural resource corporations (representing the palm oil, forestry, coal, and oil and gas industries), village and indigenous leaders, development agencies, and The Nature Conservancy.

The Provincial Climate Change Council (DDPI) acts as the focal point for the coordination of the Compact. TNC is supporting DDPI by providing process support and technical advice in developing the Compact, and by helping it create a Design Team of leaders and influencers in the province to help maintain overall strategic coherence and to support day-to-day operation of the Compact.

## WHAT NOW?

By the end of 2017, key partners will agree to a Green Growth Compact, including an overall roadmap and detailed plan for refining policy and practice solutions for its full-scale implementation. The Compact will be signed by: the Governor; the Minister of Environment and Forestry; at least five District “Bupatis”; five palm oil and forestry company CEOs; ten village

leaders; five local and national NGOs; and two international NGOs and development agencies, including TNC.

DDPI will work with these partners on a set of prototype initiatives that focus on developing early examples, models, products or systems to test key solutions. Each prototype initiative will be led by a “backbone organization” and address a key challenge for green growth in the province.

Shifting East Kalimantan onto a sustainable, forest-friendly development pathway is an ambitious goal that depends on deep cross-sector cooperation. When successfully implemented, the Green Growth Compact will inspire the change needed to achieve the lasting prosperity and inclusivity critical for conserving tropical forests and combatting climate change on a global scale.

## WHAT'S OUR DREAM HEADLINE?

*“East Kalimantan shows it is possible to achieve sustainable, inclusive growth benefitting orangutan, forests and people.”*



**“Collaboration is key to keeping the forests of East Kalimantan safe and fighting back against global climate change. The Conservancy is showing a wide range of parties that sustainable forest management yields benefits for people as well as ecosystems.”**

Rizal Algamar, Country Director, TNC Indonesia.

Tropical forest areas that have been deforested to open areas for agriculture and subsistence farming in the Kalimantan region of Borneo, Indonesia. ©Bridget Besaw

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## FURTHER INFORMATION

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## Yucatan Peninsula Sustainable Rural Development Initiative Halting deforestation and boosting farming productivity in the Mayan Forest

Elias Cahuich, a chicleero, taps trees for chicle in the forest near the *ejido* Veinte de Noviembre in the Maya Forest of Mexico's Yucatan Peninsula. ©Ami Vitale

**T**he Yucatan Peninsula is located in southeastern Mexico and separates the Caribbean Sea from the Gulf of Mexico. Shared between the three states of Campeche, Yucatan and Quintana Roo, the Peninsula's Selva Maya ecosystem is the largest continuous area of tropical vegetation in the Americas after Amazonia, containing 10 million hectares of diverse forests and serving as a vital carbon sink for the planet. This Mayan Forest sustains thousands of indigenous families and other local communities, as well as being one of the last refuges where the jaguar maintains a high population density, living alongside many other species.

Despite the region's immense natural capital, the Yucatan Peninsula is losing 80,250 hectares of biodiversity-rich forest every year due to extensive cattle ranching and agricultural production. In recent decades, the rapid advance of the agricultural frontier has begun to fragment the landscape

and threaten both the biodiversity of the region and the livelihoods of communities. Climate change has affected the area with pronounced droughts, hurricanes, and increased soil erosion. Alarm at this encroachment has led a host of local communities and organizations to investigate and try-out innovative strategies to confront the many forces causing the deterioration of the Mayan Forest.

The Nature Conservancy (TNC) has been active in the region for over a decade. Our **Yucatan Peninsula Sustainable Rural Development Initiative** is currently working with local organizations and producers in 50 communities across the Peninsula to promote low-carbon rural development through the design and implementation of improved policy and practice in agriculture, ranching, and forestry. In partnership with landowners, indigenous communities (known as *ejidos*), local and state governments, and other NGOs we are supporting multiple local-level and site-based **demonstration projects** that are leading the way towards boosting local incomes, increasing rural productivity, and halting deforestation. Examples of activities include: organic honey production; silvopastoral ranching systems; conservation agriculture for corn and soy production; and the improvement

of *milpa* systems (agro-ecological systems that integrate corn, beans, and squash), as well as forest management.

TNC has also been at the forefront of efforts to build **regional alliances** aimed at fighting climate change and deforestation that have yielded a series of ground-breaking agreements:

- In 2010, the three states of Campeche, Yucatan and Quintana Roo signed an agreement to adopt a **regional approach to climate change**, focused on reducing deforestation while increasing agricultural production.
- In 2011, to prepare Mexico for REDD+, USAID funded TNC, together with the Rainforest Alliance, *Espacios Naturales y Desarrollo Sustentable* and the Woods Hole Research Center, to implement the Mexico REDD+ Program (M-REDD+). This program aimed to test tools and approaches at the local level, and provide lessons learned to refine state and national strategies for low-carbon-emission rural and forestry development.
- In 2016, the three state governments, Mexico's federal government representatives, civil society organizations including TNC, and more than 70 companies committed to green growth and conservation by signing the Yucatan Peninsula Framework Agreement on Sustainability (ASPY)<sup>a</sup>.

#### THE 2030 GOALS OF ASPY ARE AMBITIOUS:

1. Achieve net-zero deforestation.
2. Restore 2 million hectares of degraded land, including:
  - a. sustainable intensification of cattle ranching;
  - b. sustainable intensification of agriculture; and
  - c. reforestation and forest restoration.
3. Promote integrated management across 5 million hectares of culturally and ecologically significant landscapes.
4. Leverage private and international financing to complement domestic public funding for the Green Economy.
5. Restore 20 percent of coastal reefs and 30 percent of coastal dunes for resilience against the effects of climate change.

In 2016, the US\$ 500 million World Bank-managed Carbon Fund accepted Mexico's plan to sell forest carbon emissions reductions, making Mexico one of only three countries ready to sell credits to the fund, and the only country with a truly comprehensive nested REDD+ system. The Carbon Fund could channel tens of millions of dollars to the **Yucatan Climate Action Fund** to scale up the practices we have proven to be successful through our pilot work.



Silvopastoral work is the practice of combining forestry and grazing of domesticated animals in a mutually beneficial way. © TNC

#### WHAT'S NEW HERE?

Under Mexico's unique *ejido* system, about half of the country's jungle and forested areas are community-owned. In the Mayan Forest of the Yucatan Peninsula, this ratio rises to 61 percent. This means that local people have the power to make decisions that determine the fate of the forest. However, the current development model in rural areas provides very low incomes and few opportunities, leading to growing numbers of young people migrating to cities and the increasing sale of *ejido* lands, which are then converted from traditional, forest-friendly practices to commercial farming and ranching.

To increase the efficiency of agriculture and cattle ranching without expanding into areas of intact natural habitats, there are two major challenges: understanding where and how to intensify production. The *ejidos* became true pioneers, working together in "hubs" of farmers, and with NGOs like TNC, to innovate by testing original models and schemes compatible with natural resource preservation. Traditional Mesoamerican farming systems, such as Mayan *milpa*, *solar* and *t'olche'*, are being revived and transformed, and new ways of earning a living introduced, to enable farmers to achieve higher and more stable yields, increase their income, reduce forest clearance, and contribute to mitigating the effects of climate change.

The dedication and successful "learn-by-doing" of the *ejidos* and the strong civil society alliance working with them laid the foundation for the ASPY initiative that now promises to lead the world in conservation by implementing a Green Growth Compact model for sustainable productivity and competitiveness in farming for the first time.

In order to scale up the early successes in leading communities, TNC, together with government counterparts, created a

<sup>a</sup> <https://global.nature.org/content/new-sustainability-agreement-for-yucatan-peninsula-provides-model-for-collaboration>



Sustainable Production Zoning Map<sup>b</sup>. This map spatially defines the most important areas for maintaining forest cover, as well as the areas with the highest biophysical and socioeconomic potential for 19 important crops and land uses. Land managers, from *ejidos* up to government planners, can use the map to determine which use of their land is going to give them the best social, environmental, and economic return.

The map can also be used by financial agencies, government programs, and commodity investors to determine where they can invest in sustainable intensification without causing habitat conversion. This tool can help ensure that more local communities throughout the Peninsula can develop sustainably, increasing their incomes while protecting the natural resources that sustain them. TNC is now working with other states to develop a similar map, and then hopes to scale it up to the national level.

The implementation of the map can be monitored using the **Maya Forest Watch**, a collaborative forest monitoring system supported by TNC that will provide consolidated data to guide land use decisions, including an alert system to monitor deforestation events in near-real time.

### **WHAT CHANGES DO WE WANT TO SEE IN THE WORLD BECAUSE OF THIS PROJECT?**

ASPY has the power to drive globally significant change both by virtue of its own role in conserving a valuable tropical forest system and by being a model to inspire other regions to combat climate change and deforestation through innovative local-level land management.

The achievements seen in the Yucatan Peninsula in a remarkably short period of time are being driven by a true **change in the vision of the people who live there.**

This project shows that the adoption of new productive techniques by farmers, policy-makers and decision-makers requires time, experimentation, cooperation and dissemination of efforts. By helping to drive action on the wider regional level with the ASPY and REDD+ initiatives, ASPY also proves that the **formation of local alliances and partnerships** are fundamental tools for mobilizing a change in vision and practices on a larger scale.

### **HOW DOES THIS PROJECT CONTRIBUTE TO “FREEZING THE AGRICULTURAL FOOTPRINT OF EXPANDED LAND USE”?**

Identifying and demonstrating ways to increase agricultural production per hectare, along with the planting of native



Honey production, an activity of Maya communities for centuries, can be combined with sustainable ranching and agriculture, as well as reforestation efforts. © TNC

trees as an essential component of the ranching landscape, are at the heart of the changes being introduced by *ejidos* and other communities in the Yucatan Peninsula. Silvopastoral systems have the potential to triple heads of cattle per hectare, as well as increase the productivity and welfare of each animal significantly. A productivity increase of 400 percent due to the reduction of costs and increased yield has been seen across projects. At the same time, increased tree cover, capture of nitrogen, and decreased methane emissions represent significant benefits for the environment and communities. Conservation agriculture shows a potential to increase productivity up to 60 percent. We have seen in our demonstration sites an increase of 16 percent in profits in the first two years, although we know the greatest benefits start to reflect on the third year of intervention when the formation of soil begins to be more tangible.

Through these approaches, farmers have learned to stop seeing the forest and trees as an enemy of productivity, and proven that higher yields can be achieved with relatively simple changes in management practices. Alternative and complementary activities being introduced in demonstration projects – such as raising pigs, growing citrus fruits, beekeeping, organic fertilizer use, and rotational grazing – are already generating more food and income per hectare, making the forest more productive, and reducing deforestation.

*“We do not have much to teach the farmers but we do need to remind them; because our ancestors originally planted one hectare of Mayan milpa, not ten or twenty. In that hectare they grew maize, beans, Lima beans, pumpkin, sweet potato; they had at least ten or fifteen crops. The benefit is always present when you put a tree on the ground.” José Jeremías Palomo Kú*

<sup>b</sup> <http://www.nature.org/ourinitiatives/regions/northamerica/mexico/placesweprotect/partnership-for-sustainable-intensification.xml>

## WHAT ADDITIONAL BENEFITS ARE LIKELY AS A RESULT OF INTERVENTION IN THIS AREA?

The simultaneous revival of traditional Mayan farming practices, and successful integration of innovative new ones, is breathing fresh life and hope into the *ejidos* of the Yucatan Peninsula. People are becoming more aware of the enormous value of the unique natural and cultural heritage to be found in the Mayan Forest, and excited by creative, alternative livelihoods that do not endanger the biodiversity upon which they depend. These new opportunities for women, men and young people to make a living and learn new skills should help stem the flow of people out of the region.

## WHO ARE THE MAIN ACTORS?

This project is built on layers of alliances at local, regional and international level. TNC is working with: **47 communities; 700 producers; at least 14 municipalities; three state governments; the Mexican National Forestry Agency (CONAFOR); the National Agriculture and Rural Development Agency (SAGARPA); NGOs including the Rainforest Alliance, Woods Hole Research Center, Espacios Naturales y Desarrollo Sustentable, Pronatura Península de Yucatán, Kaxil Kiuic, Uyoolche, and Biocenosis; and academic institutes including the Centro de Investigación Científica de Yucatán, the Autonomous University of Yucatán, the National Institute on Forestry, Ranching and Agricultural Research, El Colegio de la Frontera Sur, and private universities such as Universidad Marista.**

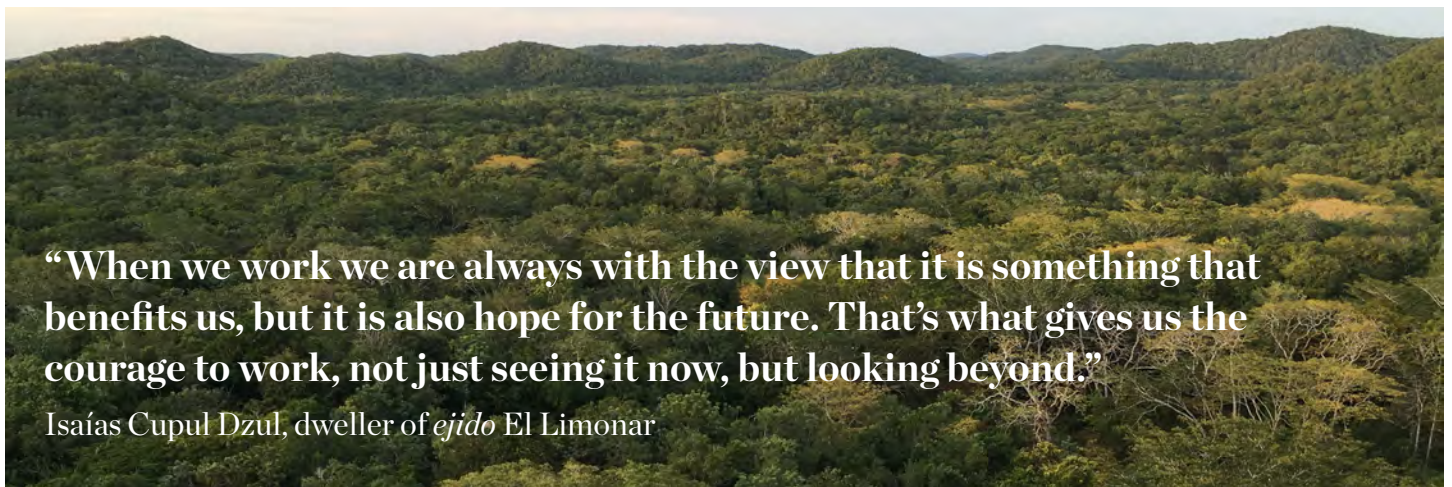
## WHAT NOW?

With the signing of ASPY in December 2016, the project enters a new phase of action. Several of the initiatives that have been piloted or recently launched now need consolidating and expanding in order to achieve our 2020 and 2030 goals. Next steps include:

- activating the **Yucatan Peninsula Climate Action Fund** for reducing deforestation and as a promoter and articulation mechanism of funding for sustainable practices;
- promoting the finalized **Sustainable Production Zoning map** (map of Go/No-Go Zones) for the Peninsula, with the participation and buy-in of government and private sector actors;
- creating **Centers for Landscape Innovation** in order to build capacity among a critical mass of producers to adopt improved practices and gain access to credit and markets;
- effectively putting into action **Mexico's REDD+ system**, which has now been fully designed and established and is pending sale of carbon credits into international markets;
- implementing **responsible sourcing actions** with the ASPY companies to green the agriculture and ranching value chains; and
- building out **Maya Forest Watch**, including an early detection system for deforestation and open access to state of the art monitoring technologies.

## WHAT'S OUR DREAM HEADLINE?

*“Mayan farmers look to their ancestors – and to innovation – to build new future for the Yucatan forest”*



**“When we work we are always with the view that it is something that benefits us, but it is also hope for the future. That’s what gives us the courage to work, not just seeing it now, but looking beyond.”**

Isaías Cupul Dzul, dweller of *ejido* El Limonar

The Kaxil Kiuic Biocultural Reserve conducts important research and education in archaeology, biology and conservation. In collaboration with Millsaps College and other partners, the Nature Conservancy works with local communities to measure the results of climate change mitigation actions, like measuring conserved forest biomass. © TNC

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### FURTHER INFORMATION

These factsheets are part of a global series highlighting TNC's work around the world to improve agricultural practices as demand for food and land increases.

The Nature Conservancy is a global conservation organization dedicated to conserving the lands and waters on which all life depends. Guided by science, we create innovative, on-the-ground solutions to our world's toughest challenges so that nature and people can thrive together. We are tackling climate change, conserving lands, waters and oceans at unprecedented scale, and helping make cities more sustainable. Working in more than 65 countries, we use a collaborative approach that engages local communities, governments, the private sector, and other partners. To learn more, visit [www.nature.org](http://www.nature.org) or follow @nature\_press on Twitter.





Center pivot irrigating corn near Ogallala, Nebraska. © Chris Helzer/TNC

Nebraska is in the center of the United States, dominated by the Great Plains and with the Platte River, formed by the confluence of the North Platte and the South Platte, flowing eastward across the state. The Western Nebraska Irrigation Project (WNIP) is based in southwest Nebraska, on a 20-mile stretch of the South Platte River Valley west of Ogallala. The Platte River is a tributary of the Missouri River, itself a tributary of the Mississippi, the basin of which is the fourth largest in the world, spanning 31 US states and stretching from Canada to the Gulf of Mexico.

Launched in 2014, WNIP aims to show farmers the water and money-saving potential of employing good management practices and new irrigation techniques. Together with our main project partner, Coca-Cola, The Nature Conservancy (TNC) set the ambitious goal of saving 2.7 billion liters of water through precision irrigation in three years. The actual outcome by the end of the third growing season was 3.9 billion liters saved, greatly exceeding our expectations.

This work is a natural extension of the long-standing TNC program aimed at conserving the water and biodiversity of the Platte River system, through which we have restored and protected over 103,000 acres\* of land in Nebraska and helped restore wetlands and prairies vital to migratory birds and other endangered species. Over many decades working in and studying this region, it became clear that better management of water resources was needed on the Platte River. In a state where irrigation accounts for 90 percent of consumptive water use, the solution to securing a sustainable water balance lies with Nebraska's hugely important agriculture sector.

Nebraska has more acres of irrigated cropland than any state in the US and produces 40 percent of the nation's irrigated corn. In 2016, among the 50 states, Nebraska was first for commercial red meat production, third for corn production, and fourth for the total amount of land used for farms and ranches – 45.2 million acres, amounting to 91 percent of the state's total land area. There are 7 million acres of irrigated land in the Platte River Valley alone.

The potential for conserving water – and saving farmers time and money in the process – is enormous. This attracted the

interest of the Coca-Cola water replenishment program that has been working with communities, governments and other partners since 2005 to help meet their goal of safely returning to communities and nature the same amount of water that they use to make their products.

Together with other WNIP partners, including John Deere and the World Wide Fund For Nature (WWF), and the farmers who chose to enroll in the project, TNC and Coca-Cola are demonstrating the tangible benefits to both farmers and nature that can be gained by taking advantage of emerging irrigation technologies. Farmers were invited to join WNIP on a 50:50 cost-sharing basis; after just three years, enrollment includes one-third of all producers and one-third of the fields in the total project area. This positive response to the project reflects the growing interest in smart, sustainable agriculture.

The 20,000-acre project site was chosen for several reasons, including the high concentration of center pivot irrigation, the availability of high quality historic water use records, and the hydrologic and geologic features of the watershed that serve to isolate it from the surrounding region. It offers the ideal conditions for achieving and measuring significant change.

### **WHAT'S NEW HERE?**

Rather than pit farming against conservation by aiming to reduce the amount of land under irrigation, this project set out to show how we can reduce farmers' water withdrawals instead. Before WNIP, few farmers in the area had the resources and training to launch precision irrigation technologies. TNC and partners wanted to understand impacts at a larger scale, so set out to work with farmers, in their own fields and on a scale large enough to demonstrate the quantifiable benefits of improved water efficiency and how it could boost both productivity and the health of the watershed.



Jacob Fritton, Performance Irrigation Coordinator (blue shirt, center) explains the fundamentals of the Western Nebraska Irrigation Project to Nebraska's Board of Trustees. © Chris Helzer/TNC

Advanced irrigation scheduling was put in place to determine precisely when and how much water needs to be applied, using soil moisture probe information, electroconductivity mapping, newly installed weather stations, and each crop's own growth stage and conditions. Introducing pivot telemetry—irrigation monitoring systems using GPS and cell phone modems—was a key innovation. Farmers now had the ability to operate their pivots remotely from their mobile phones, eliminating the time, wages and fuel costs associated with driving around to make adjustments and cutting wasteful overwatering. Soil moisture probes can guide irrigation decisions throughout the season and help farmers to understand what is happening in the root zone of their crop. Along with other complementary tools, soil moisture probes also generate accurate historical reports to help plan for the future.

Introducing new equipment and practices required ongoing dialogue and training, a task largely taken on by the TNC project manager. Participants completed technical training and provided valuable feedback on how they implemented changes to their irrigation strategy. Since water is basically free for farmers, the expected savings in electricity, fuel and fertilizer were used to build a compelling argument to recruit participants. But what really swayed farmers was the fact that they could see that the new technology would allow them to generate higher yield per input. Farmers say their offices now look like air traffic control centers, and they are witnessing the growing efficiency and productivity with their own eyes.

### **WHAT CHANGES DO WE WANT TO SEE IN THE WORLD BECAUSE OF THIS PROJECT?**

The 3.9 billion liters of water saved by the WNIP project over three years represents 2.05 inches per acre per year. Fields involved with the project contain 55 pivots and cover 8,000 acres, a drop in the ocean compared to the vast expanses of Nebraska, not to mention the rest of the US and other countries heavily dependent on irrigated crops. But the successful introduction of advanced irrigation technology in this small watershed can be used as a model for developing initiatives to improve the water balance in larger watersheds around the world.

To help build the case for WNIP as a model to be replicated, a network of 19 groundwater monitoring wells were drilled and level-logging equipment was installed to generate consistent information on the fluctuation of aquifer levels. The project also utilized an array of in-field monitors to look at the field scale movement of water based on the new agronomic practices and irrigation scheduling. This watershed monitoring equipment will continue to collect



information and measure the long-term effects of introducing precision irrigation on watershed health, in effect creating an interactive water map of the project area.

Since agriculture is by far the world's biggest water user, responsible for 70 percent of global consumption, increased efficiency in irrigation can have a transformational effect on water availability and quality around the world. TNC is working with partners at the University of Nebraska to examine the specific ecological response to using less water in this area. The aim is to determine whether, how and to what extent the water saved by farmers could aid the replenishment of the groundwater table, contribute to better stream function, and improve water quality, and how this would benefit farmers, communities and ecosystems. This analysis will help local authorities take steps to reduce water consumption through farmers benefiting from more efficient irrigation techniques, for example by retiring or reallocating some water rights to improve the balance.

### **HOW DOES THIS PROJECT CONTRIBUTE TO "FREEZING THE AGRICULTURAL FOOTPRINT OF EXPANDED LAND USE"?**

WNIP seeks to show that it is possible to produce more output on the same amount of land using less water. If farmers can be convinced of the benefits of sustainable agricultural intensification in their existing fields, there is less incentive to expand their land use. The evidence gathered by this project should help motivate farmers to invest in advanced precision irrigation systems to ensure the best returns from their investments and, together with water use regulations, support a sustainable water balance that will allow their farms to thrive in the future.

The more farmers know about their soil, the more precisely they can manage inputs, seeding, fertilizer use and irrigation. WNIP participants completed a Field to Market Fieldprint calculator, which shows the environmental performance of their management practices against local, state and national benchmarks for key sustainability indicators. Alongside their own financial savings, these performance indicators reveal the win-win opportunities for farmers and nature.

Agriculture is a growth industry in Nebraska. During the five-year period between 2007 and 2012, the state experienced a 5 percent increase in the number of farms and a 10 percent increase in the number of new farmers. With over 90 percent of land in Nebraska already taken by farms and ranches, and many ground and surface water systems over-appropriated, the only sustainable route for continued agricultural growth is by increasing efficiency through smart, data-led farming.



Irrigated corn near Ogallala, Nebraska. © Chris Helzer/TNC

Solutions like those demonstrated by WNIP, scaled up and adapted to suit other regions, can help the world to feed its growing population without expanding agriculture's land or water footprint.

### **WHAT ADDITIONAL BENEFITS ARE LIKELY AS A RESULT OF INTERVENTION IN THIS AREA?**

As farmers gain greater understanding of the local water system, and the data provided by weather stations and soil probes, they will be able to more accurately predict how much water they need to grow their crops. This will make it easier for them to comply with any water restrictions imposed by local authorities, and allow them to make informed decisions in response to changes in conditions brought about by climate change, drought or other factors.

WNIP has received overwhelmingly positive feedback from farmers enrolled in the project. They appreciate being engaged in an initiative where they drive practical solutions to local natural resources challenges, and work as the allies of conservationists rather than their adversaries. Many farmers stress the time-saving benefit of the new technology, with one reporting that, "It is hard to put a value on the peace of mind when I can glance at my cell phone and know what is going on."

### **WHO ARE THE MAIN ACTORS?**

WNIP is run by TNC, with support from Coca-Cola, John Deere and McDonalds. Other partners include the Nebraska Water Balance Alliance, the South and Twin Platte Natural Resource Districts, WWF, and the University of Nebraska-Lincoln. But the most important actors are the farmers enrolled in the project, who have shared the cost of installing the new technology and cooperated actively to allow WNIP to gather a huge amount of vital information.

This project is also associated with the Midwest Row Crop Collaborative (MRCC), a diverse coalition of food and agriculture supply chain companies and conservation organizations of which TNC is a founding member. In addition to helping expand the work of the Soil Health Partnership by building a network of 100 demonstration farms across the Midwest, the MRCC is targeting three pilot states—one being Nebraska—to support efficient and sustainable food production.

### WHAT NOW?

WNIP is keen to build on the momentum created over the last three years. Now that the agreed cost-sharing period has ended, it is hoped that those farmers enrolled in the project will carry on with the efficiency improvements as they can see that it makes economic sense.

For TNC, the next phase will be focused on working with scientists to further develop the field scale understanding of

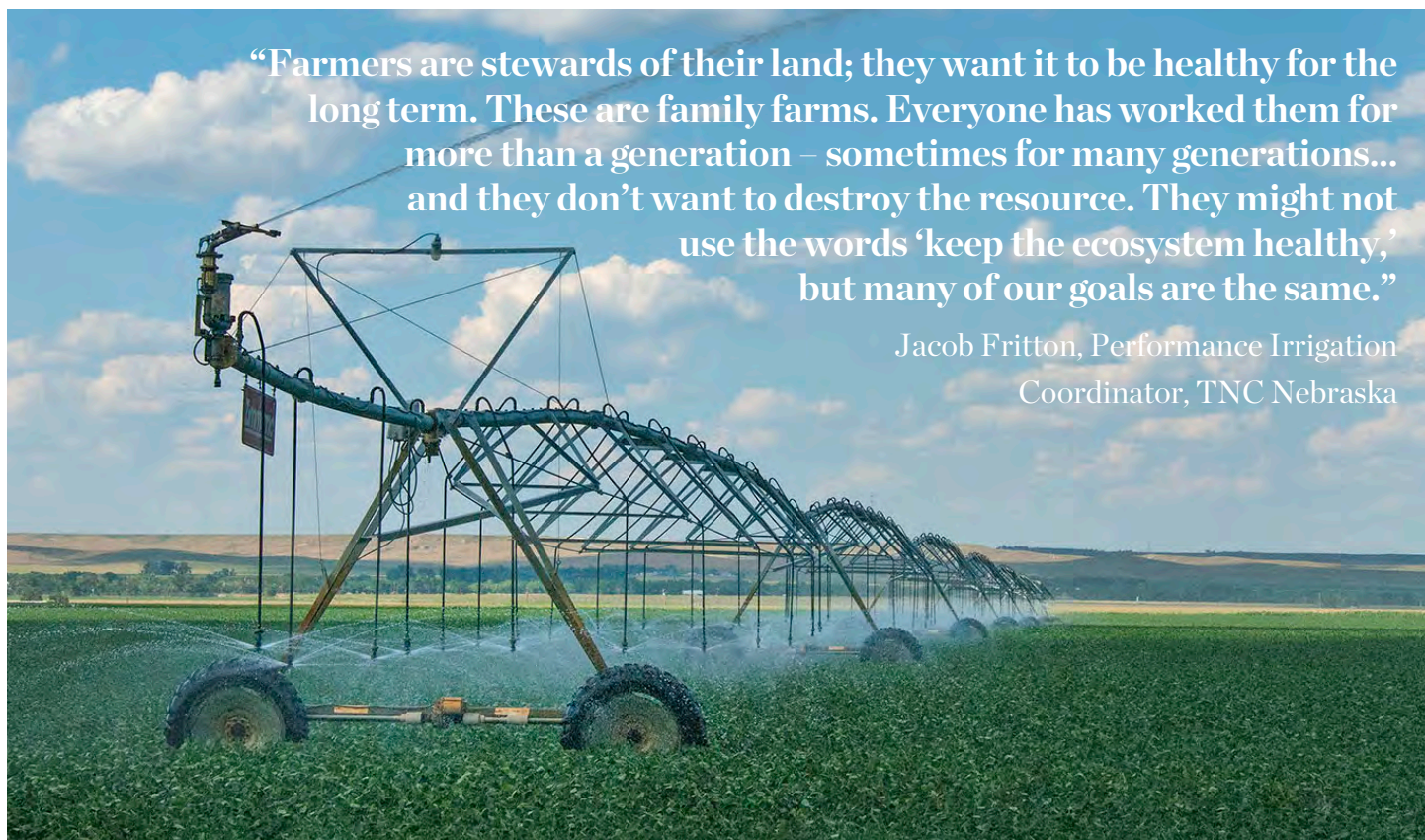
changes to practices, evaluating the links between performance at the field level and watershed scale, including groundwater levels, and building a model to effectively disseminate best management practices across Nebraska.

The Conservancy is currently fundraising to keep the Performance Irrigation Coordinator position in place for at least another two years in order to coordinate farmer interactions and data collection.

The Western Nebraska Irrigation Project has generated a huge volume of data. TNC looks forward to sharing the impacts of the technologies with a wider audience and working with new partners to duplicate its success.

### WHAT'S OUR DREAM HEADLINE?

*“Saving billions of liters and millions of dollars: Nebraska farmers embrace high-tech irrigation to restore natural water balance.”*



**“Farmers are stewards of their land; they want it to be healthy for the long term. These are family farms. Everyone has worked them for more than a generation – sometimes for many generations... and they don’t want to destroy the resource. They might not use the words ‘keep the ecosystem healthy,’ but many of our goals are the same.”**

Jacob Fritton, Performance Irrigation Coordinator, TNC Nebraska

Center pivot irrigating soybeans near Ogallala, Nebraska. © Chris Helzer

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### FURTHER INFORMATION

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## Sustainable grazing lands Putting land to work for people and nature

San Felipe Ranch, CA - an active cattle ranch owned by the HP families. The ranch is the missing link in a corridor of protected lands that stretches 70 miles from Pacheco Pass to Livermore Valley. © Ian Shive

**L**ivestock grazing stretches across 30 percent of the total land area of the United States – approximately 761 million acres, mostly in the west of the country. These grazing landscapes include vast expanses of private and public lands that sustain resident, wide-ranging, and migratory wildlife and provide people and communities with livelihoods, food, water, and recreation, and help store carbon in the soil.

Since the advent of European settlement in North America, grasslands, savannas, woodlands, and shrub lands have been heavily influenced by human development and land uses. Invasive species, land conversion, water diversion, incompatible grazing practices, and altered fire cycles can negatively impact rangeland productivity for beef producers and habitat for native plants and animals. Between 30 and 70 percent of grazed lands in North America are now considered degraded and improved livestock grazing is the management tool with the greatest potential to benefit biodiversity on native grasslands.

Many grasses and grazing lands co-evolved with wild herbivores. Where native grazing animal populations have dwindled, livestock grazing can play an important role in maintaining the ecological condition of prairies and other grazing lands and in sustaining habitat for many native species.

Challenges do, however, remain. Many grazed lands in North America need urgent attention to improve their condition relative to wildlife conservation, food production, and viable agricultural enterprises. Across the vast swaths of grazing land in North America, numerous private and public entities (government agencies, university departments, NGOs, industry associations) are involved in rangeland research and management.

Among these, The Nature Conservancy (TNC) owns and manages preserves totaling >500,000 acres of grazing land in the U.S. and is engaged with private and public partners who own and manage millions more. These land and relationship assets are unique resources in themselves. TNC research shows that there are several practical, highly effective ways to encourage sustainable grazing land management and build function and value.

To advance enduring conservation outcomes that benefit communities and nature, TNC's Sustainable Grazing Lands Program is a 10-year initiative aimed at improving human and conservation outcomes on 80 million acres of vitally important grazing across iconic landscapes in North America.

We will do this by equipping ranchers and partners with proven planning and management tools that can help them thrive in the face of multiple challenges to the long-term health of grazing land ecosystems, wildlife populations, and family ranch businesses.

By 2027, TNC will catalyze these outcomes by:

- **implementing** integrated science-based planning and grazing management strategies for multiple benefits on our lands and the properties of partner landowners, and tracking performance;
- **documenting and communicating** the economic, community, and environmental benefits of implementing integrated ranch plans and grazing strategies across dozens of geographically diverse properties through a best-in-class open source information nexus and suite of planning tools;
- **partnering** across the supply chain to provide access to planning tools and financing for inputs, infrastructure and livestock assets required by rancher owners and managers to achieve desired goals under their plans.

The project will demonstrate and document how improved planning on grazing operations can lead to improved ecological conditions, including benefits to water quality, climate mitigation goals, and wildlife habitat, as well as to ranching businesses and communities.

By collaborating with ranchers and other key partners in the “on-ranch” portion of the beef supply chain, TNC is using science to influence, inspire and support the industry in the widespread adoption of sustainable practices at an unprecedented scale across North America's grazing lands.



Gabilan Mountains, California © Sacha Gennet/TNC

## WHAT'S NEW HERE?

TNC occupies a unique position in the conservation community in the U.S. as the only major group with a direct investment and strong interest in both the ecological and economic aspects of grazing. Environmentally sustainable, profitable ranching operations are crucial to the future of North America's rangelands, and TNC has built strong, trust-based partnerships with the ranching community over many years. Conservancy-owned lands are being used for research and demonstration, developing and applying cutting-edge grazing techniques and ecological science, helping investors to mitigate risk, and allowing TNC to act as a convener of diverse stakeholder groups that encompass the entire beef supply chain.

The North American Sustainable Grazing Lands Program is working cooperatively with all these partners and a range of experts to accelerate the adoption of proven but currently under-used planning and management practices, while also developing and testing new tools to fill gaps and better meet the needs of ranchers, consumers, and nature in the 21st century. In this way, we are encouraging ranchers and other participants in the beef supply chain to see themselves as key players in the long-term conservation of rangelands, and helping them to access the resources and financing needed to improve outcomes on the ground.

**Elements of this work are occurring in many places in North America, including:**

- Four pilot projects in eastern Colorado, designed to assess how integrated ranch planning and management can simultaneously improve ecological, social, and business outcomes, are underway with promising early results. These pilots include two TNC preserves (**The Fox and JE Canyon Ranches**), one private ranch, and one public lands ranch.
- Ground-breaking work underway on TNC's 60,000-acre **Matador Ranch in Montana**, located on some of North America's best remaining mixed-grass prairie, where TNC, local ranchers and scientists have been working to identify intersections between effective land management and healthy wildlife for 15 years.
- **The Chippewa Prairie in Minnesota**, where TNC and the Minnesota Department of Natural Resources are using GPS tracking to gain a better understanding of how cows move on rangelands. The cows' GPS collars are also shedding light on a land management technique called patch-burn grazing. Instead of building fencing, cows follow controlled burns made on the prairie. Land managers working at Chippewa Prairie are testing the idea that this type of grazing will lead to greater biodiversity of plants, birds, butterflies, small mammals and reptiles.



- Finally, TNC scientists in California have developed predictive forage productivity mapping software based on satellite imagery that saves time and money for land managers, and helps ensure better conservation outcomes.

## WHAT CHANGES DO WE WANT TO SEE IN THE WORLD BECAUSE OF THIS PROJECT?

As the human population continues to grow, there is a clear need for tools and strategies to better manage grasslands for the plants, animals, and ecosystems that rely on them and for human food security and rural livelihoods. To meet the demands of food production and other ecosystem services we will need to increase production on these lands while improving overall condition, and make grazing more resilient to growing threats such as drought. The only way forward is the widespread adoption of sustainable grazing techniques like those being pioneered by TNC and partners in North America.

Primary impacts of incompatible grazing management may include high water use, the widespread degradation of soil and water quality, and loss of wildlife habitat. A recent TNC study found that the ranch and farm grazing phase of the beef supply chain has more pronounced ecological impacts than had been previously understood. Since the U.S. has the largest fed-cattle industry in the world – which supplies a domestic market of 25.5 billion pounds (11.5 billion kg) of beef each year and is responsible for globally significant environmental impacts – it is critical that we find ways to improve its sustainability.

Sustainable and restorative grazing are key components of the global conservation toolkit. TNC believes that documenting and improving grazing strategies in priority grasslands in North America can better equip us to expand that knowledge and boost the role of ranchers as active conservation partners across the world's rangelands.

## HOW DOES THIS PROJECT CONTRIBUTE TO "FREEZING THE AGRICULTURAL FOOTPRINT OF EXPANDED LAND USE"?

Livestock grazing is the most extensive human land use on the planet, occurring on roughly 40 percent of the Earth's land surface, equivalent to between 10 and 12 billion acres. As it is the only option for producing food in many places, improving grazing practices and grassland condition is a vital component of the sustainable intensification of food production globally. Grazing operations that are managed using multi-benefit, science-based planning systems can raise productivity, permit higher stocking densities, and significantly improve financial, social and ecological returns, thereby relieving the pressure to convert more grazing lands to cultivation or other incompatible uses.



Local ranchers participating in The Nature Conservancy's Grassbank program herding cattle at Heart Mountain Ranch. © Will van Overbeek

## WHAT ADDITIONAL BENEFITS ARE LIKELY AS A RESULT OF INTERVENTION IN THIS AREA?

The grazing of livestock is the only known large-scale economic human use of intact native ecological systems that is generally compatible with the conservation of biodiversity. In today's world, this makes the sustainability of livestock agriculture essential to maintaining the intactness of many ecological systems and achieving conservation over huge areas of our planet.

While it is true that assessments show that beef production produces significant greenhouse gas emissions, it is also true that: (1) the lands where cattle graze store a tremendous amount of carbon that would be at risk of being released into the atmosphere if they were to be cultivated or converted to other uses besides grazing and (2) that much of the enteric methane produced by domestic grazing animals today was produced by wild grazers like bison that were present on grazing lands in the past.

Beyond the grazing phases of livestock production, there are also important opportunities to improve feed production and manure management at feedlots to reduce carbon emissions, for example by installing aerobic digesters.

Protecting rangelands and their carbon storage and sequestration service is hugely important. In a world where economic stress and food insecurity are daily concerns for millions of people, livestock grazing is the only means we have of efficiently converting human-inedible grass biomass into human-edible protein and fat. Livestock grazing helps maintain ecological integrity and soil carbon stocks, while providing nearly 800 million people with livelihoods and billions more with food. The Nature Conservancy continues to actively seek ways to protect wildlife and habitats on grazing lands.

## WHO ARE THE MAIN ACTORS?

TNC is collaborating with a broad spectrum of partners including public and private landowners and ranchers, scientists, major food companies, the Global and U.S. Roundtables for Sustainable Beef, state governments and local authorities, and the Natural Resources Conservation Service of the U.S. Department of Agriculture.

## WHAT'S NEXT?

There is plenty of work left to do: we still need to figure out which grazing planning improvements will make the most impact and to consider how to integrate them with other important issues such as animal welfare and social concerns.

We also need to work with beef producers to determine how to make these recommendations more practical to implement, in order to stimulate the take-up required to make substantial improvements at scale.

TNC's research on sustainable grazing lands and engagement with the U.S. beef supply chain lays out a strong knowledge base upon which to found greater stakeholder engagement in more sustainable, strategic business decisions around beef, but we still need to better document and communicate improved outcomes if we are to be successful in scaling up sustainable grazing practices through the wider application of integrated ranch planning. This is essential for achieving our ambitious targets for food production, carbon storage, and long-term ecological outcomes.

**Overall goal:** To advance enduring conservation outcomes and benefit people and communities, The Nature Conservancy's North American Sustainable Grazing Lands Program will, by 2025, improve management on 10 percent of the area grazed in the U.S., or 80 million acres.

## WHAT'S OUR DREAM HEADLINE?

*"Grazing over the horizon: how science and better supply chains can feed and look after the Earth."*



Ed Carroll and cattle in spring pasture grasslands at Kaweah Oaks Preserve, near Visalia, Tulare County, California. © Gary Crabbe/Enlightened Images Photography

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## FURTHER INFORMATION

These factsheets are part of a global series highlighting TNC's work around the world to improve agricultural practices as demand for food and land increases.

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