



The Measure of a Land

Establishing an Integrated Baseline for Smart Agricultural Investment

Southern Agricultural Growth
Corridor of Tanzania (SAGCOT)

VITAL SIGNS



What we measure affects what we do; and if our measurements are flawed, decisions may be distorted... Those attempting to guide the economy and our societies are like pilots trying to steer a course without a reliable compass. The decisions they make depend on what we measure, how good our measurements are and how well our measures are understood. We are almost blind when the metrics on which action is based are ill-designed or when they are not well understood...

WE NEED BETTER METRICS.

— Stiglitz-Sen-Fitoussi Commission on the Measurement of Economic Performance and Social Progress (2009)

Through an innovative pilot project in 2010, Tanzania developed the prototype model for Vital Signs: an open-access, transparent monitoring system. Vital Signs provides critical metrics to inform smart, sustainable agricultural development. A sampling can be found on the pages that follow. This report is based on data collected from the pilot project by Conservation International and the partners listed below.

PILOT PROJECT PARTNERS

Sokoine University of Agriculture
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Tanzania Forest Conservation Group
Tanzania Meteorological Agency
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World Bank Living Standards Measurement Study:
Integrated Surveys on Agriculture

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SAGCOT At a Glance

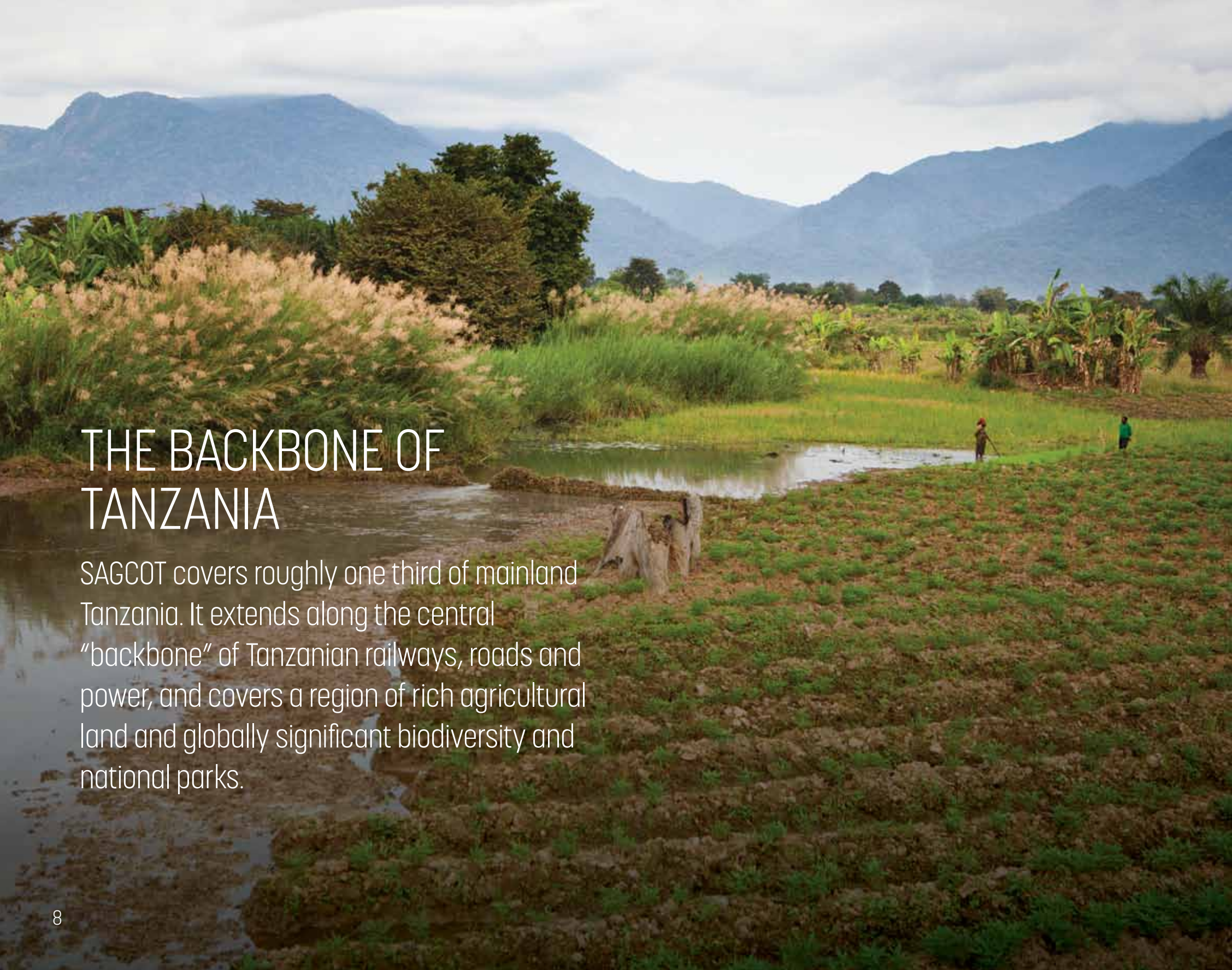


The Southern Agricultural Growth Corridor of Tanzania (SAGCOT) is home to 11.1 million people. Most are smallholder farmers with less than 2 hectares of land, living on \$0.50 to \$1.00 per day.

Government of Tanzania goals for SAGCOT:

- \$1.2 billion in farming revenues per year
- Sustainable agricultural growth
- More than two million people lifted permanently out of poverty

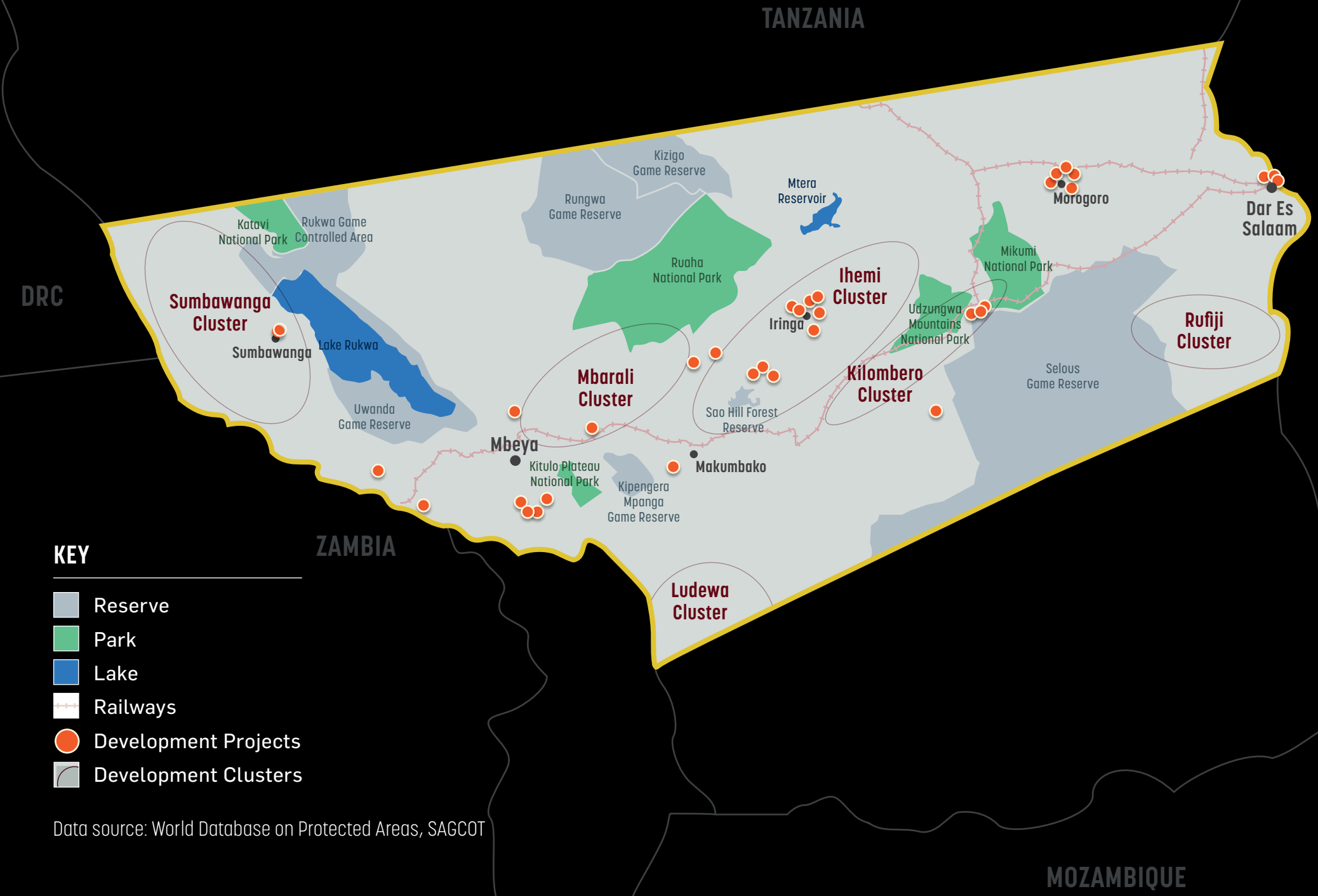
These objectives are guided by national agricultural, development and environmental policies. Tanzania's National Poverty Reduction Strategy (2000) emphasizes the need to incorporate environmental quality indicators into its poverty monitoring system to quantify linkages between human well-being and the benefits and services from nature.



THE BACKBONE OF TANZANIA

SAGCOT covers roughly one third of mainland Tanzania. It extends along the central “backbone” of Tanzanian railways, roads and power, and covers a region of rich agricultural land and globally significant biodiversity and national parks.

SAGCOT DEVELOPMENT CLUSTERS AND PROTECTED AREAS



- KEY**
- Reserve
 - Park
 - Lake
 - Railways
 - Development Projects
 - Development Clusters

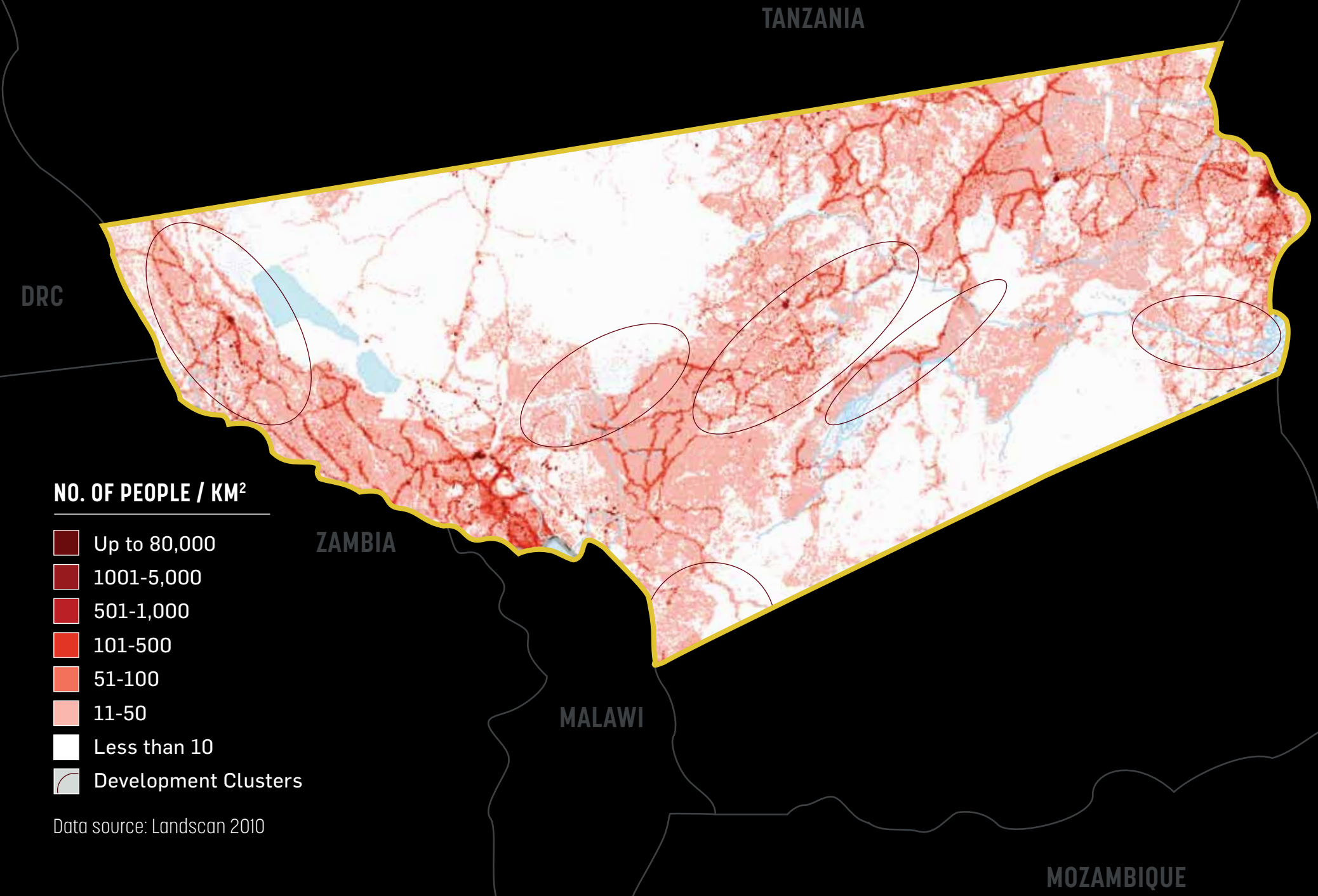
Data source: World Database on Protected Areas, SAGCOT



POPULATION

Approximately 11.1 million people, about 24% of the population of Tanzania, currently live in the corridor. Population is projected to increase to 16 million by 2025. Overall, population density in Tanzania is expected to increase by 6-10% by 2015.

2010 POPULATION DENSITY

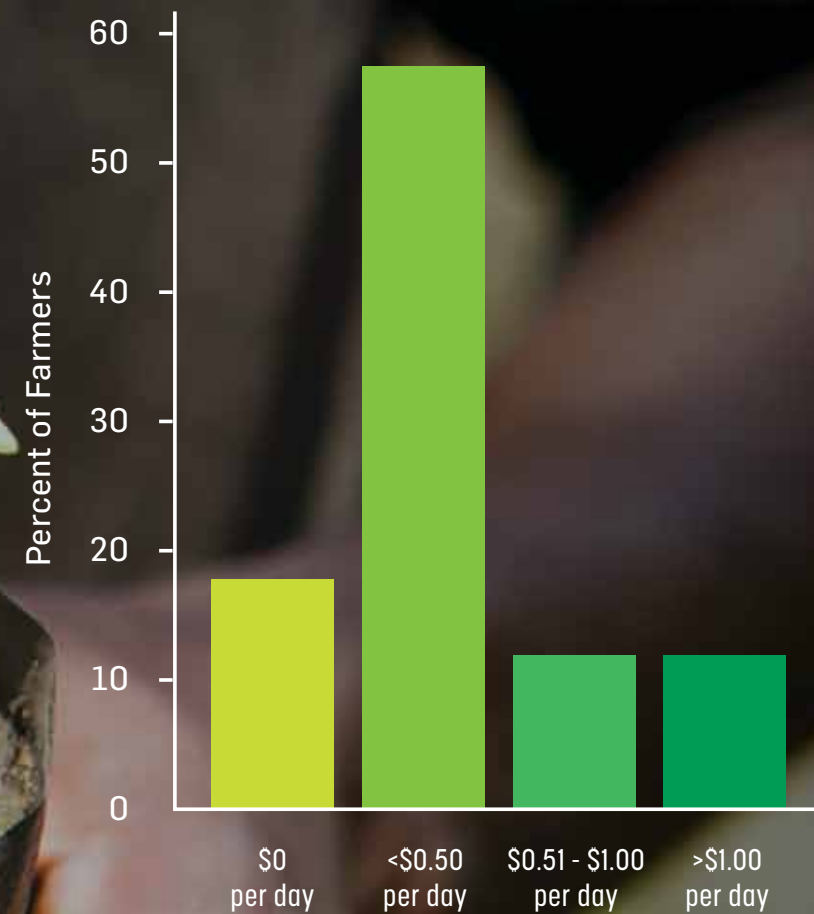


AGRICULTURE

Current agricultural practices within the corridor are unsustainable. Crop yields are low, and agricultural practices are degrading ecosystems and the essential services they provide for people.



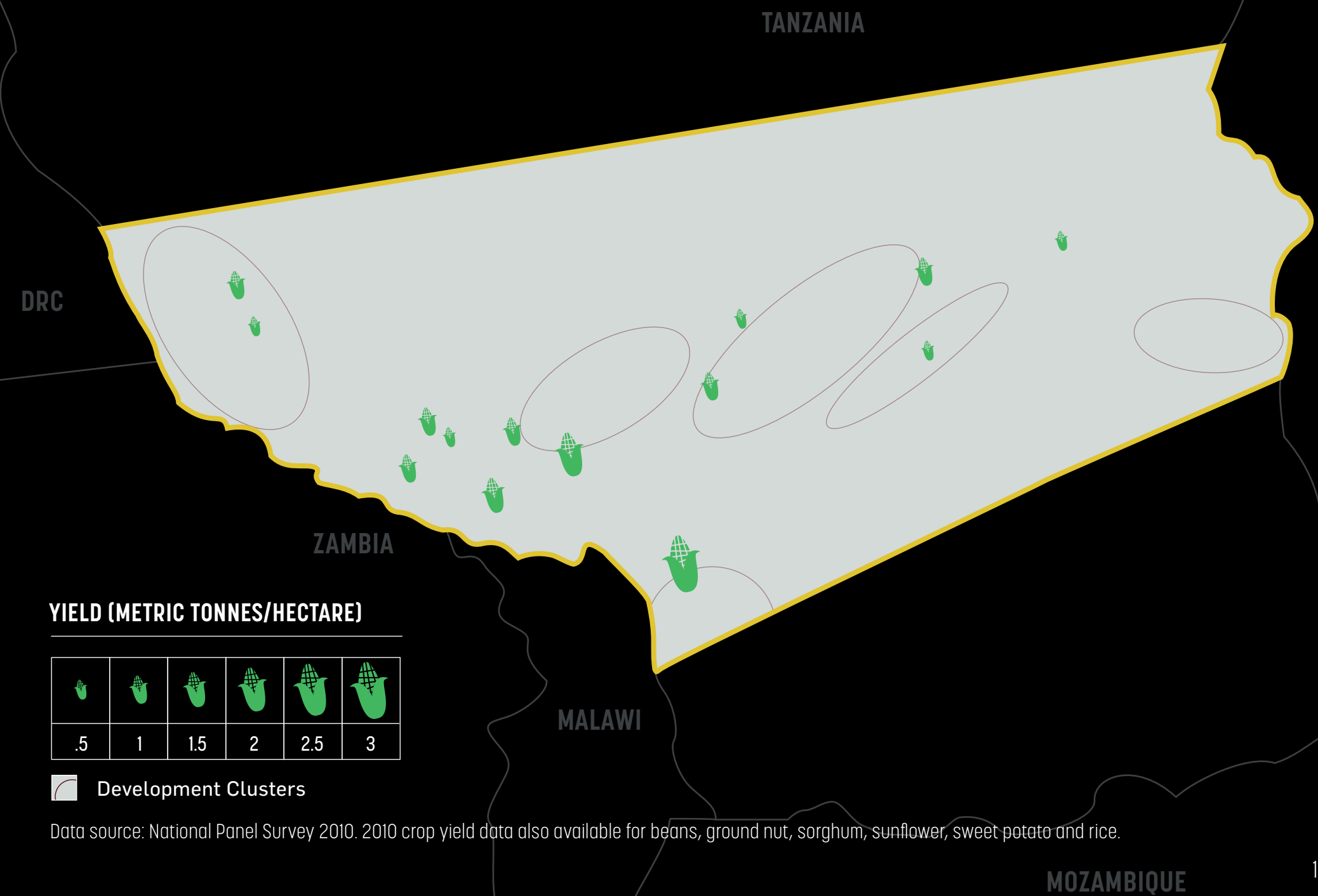
FARMERS' INCOME FROM AGRICULTURE 2010



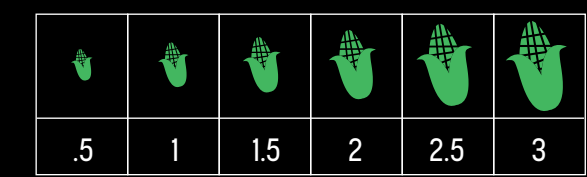
**N=545 HOUSEHOLDS
INCOME DISPLAYED IN US DOLLARS**

Source: National Panel Survey 2010

2010 YIELD OF MAIZE GROWN BY SMALLHOLDER FARMERS



YIELD (METRIC TONNES/HECTARE)



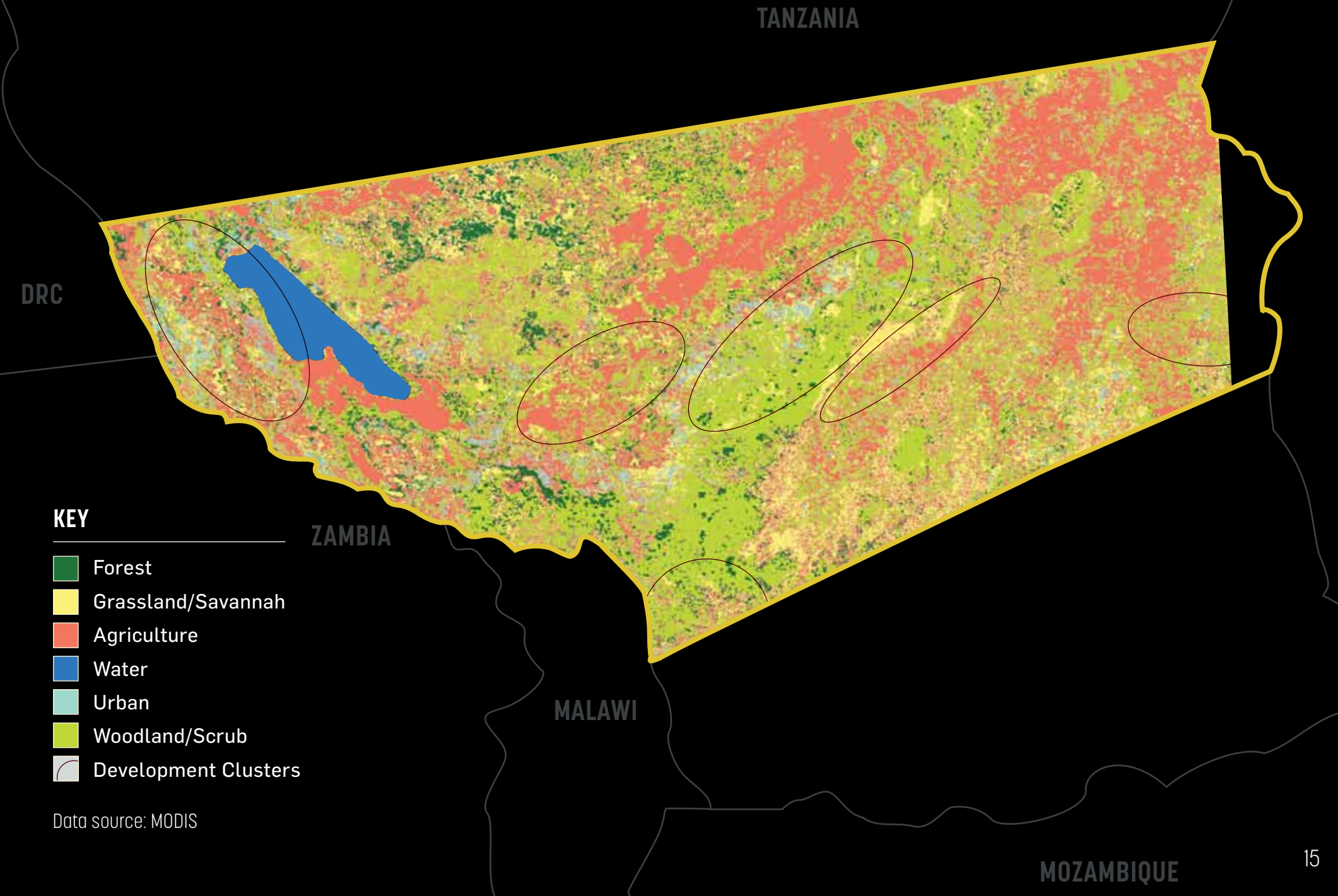
Development Clusters

Data source: National Panel Survey 2010. 2010 crop yield data also available for beans, ground nut, sorghum, sunflower, sweet potato and rice.

LANDSCAPE STRUCTURE AND COMPOSITION

Land cover is the physical land type covering the Earth, such as forest, agriculture or savanna. Landscape structure and composition (LSC) is the type and amount of vegetation and its spatial arrangement in a landscape. LSC, together with climate, plays a critical role in determining what ecosystem services a landscape can provide. Currently, only about 25% of SAGCOT lands are in agriculture and only about 10% is forest.

2010 LAND COVER



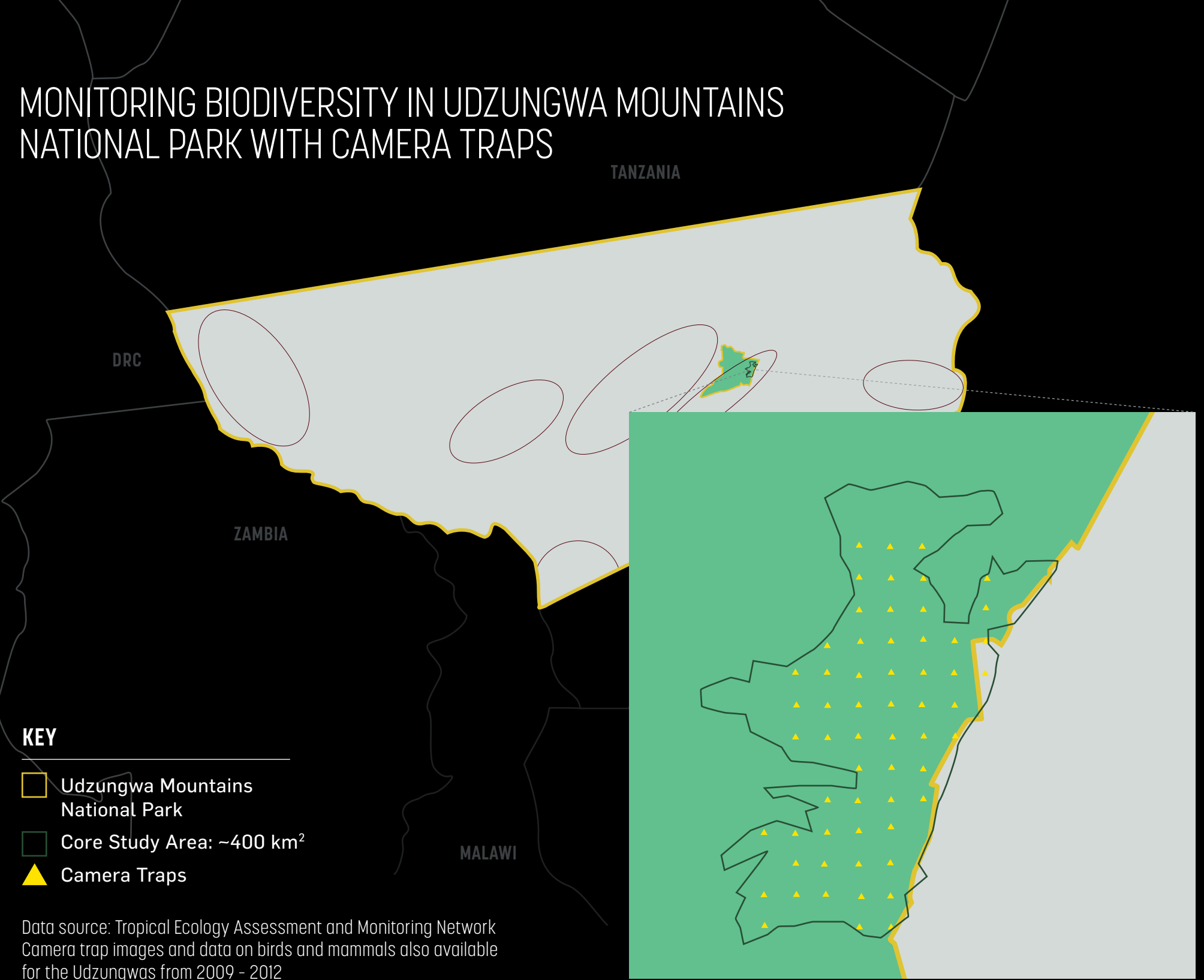
BIODIVERSITY

Nature-based tourism is Tanzania's leading economic sector and a critical source of foreign exchange. Within SAGCOT, national park entry fees and permits for hunting and photography within the reserves total more than US\$650 million per year. The Eastern Arc and Coastal Forests within SAGCOT include many unique species found nowhere else on Earth.

Photo credit: Image courtesy of TEAM Network, Trento Science Museum



MONITORING BIODIVERSITY IN UDZUNGWA MOUNTAINS NATIONAL PARK WITH CAMERA TRAPS

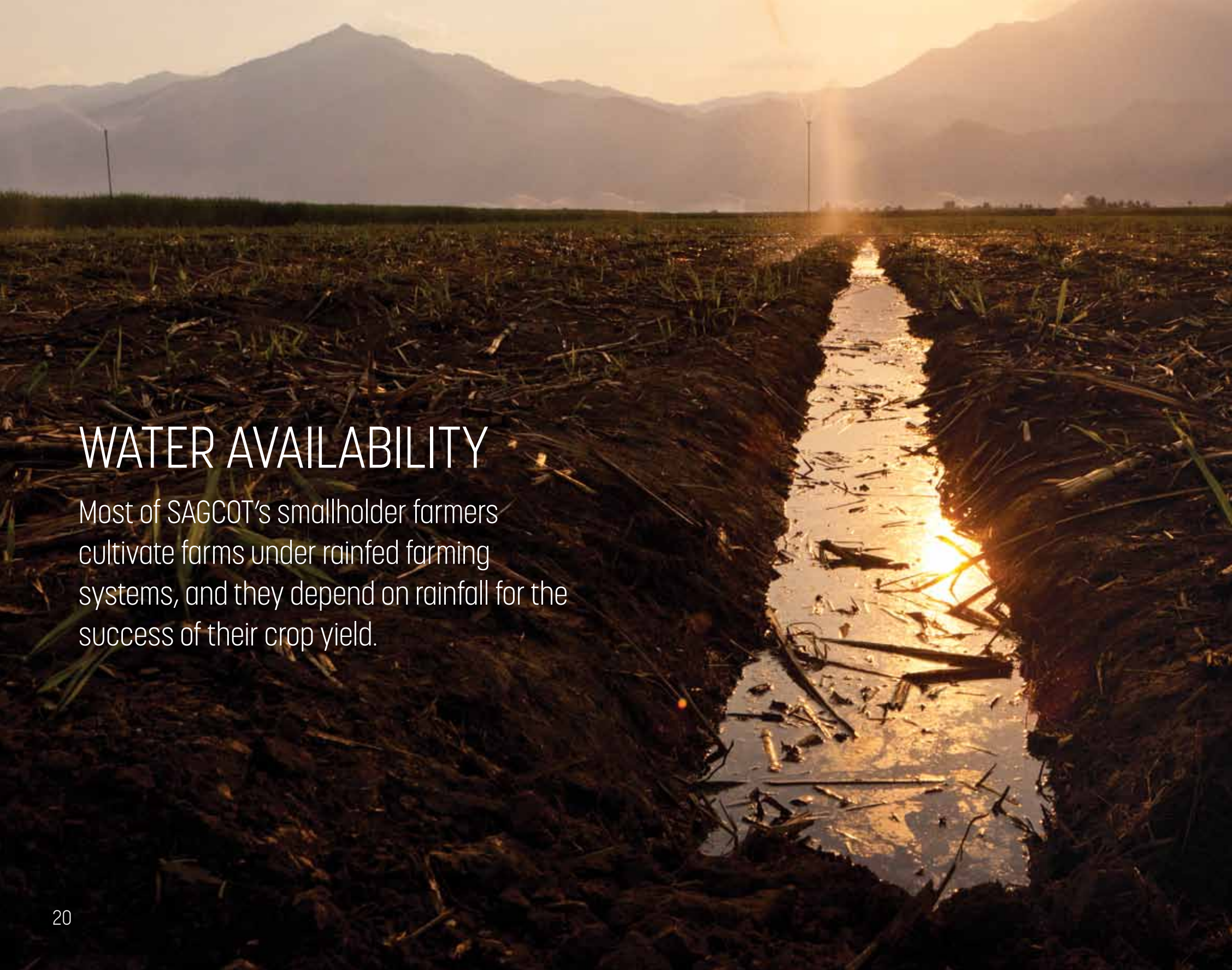


Nature's Role in Farmers' Well-Being

Perhaps more than any other group of people, farmers rely upon nature for their livelihoods and their way of life.

Their productivity directly depends upon the health and integrity of the ecosystems that provide them energy, water, and fertile soils for their crops.

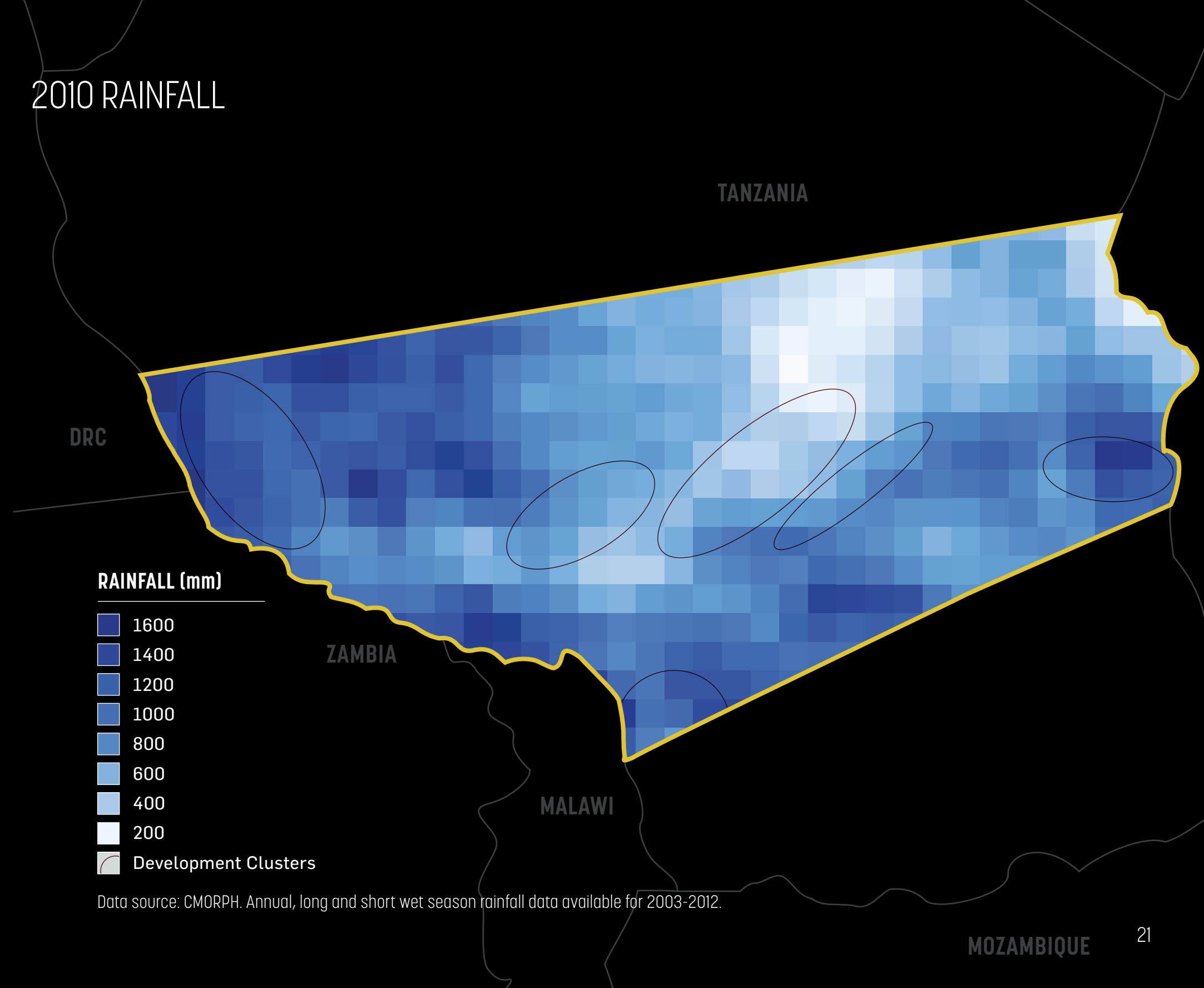




WATER AVAILABILITY

Most of SAGCOT's smallholder farmers cultivate farms under rainfed farming systems, and they depend on rainfall for the success of their crop yield.

2010 RAINFALL



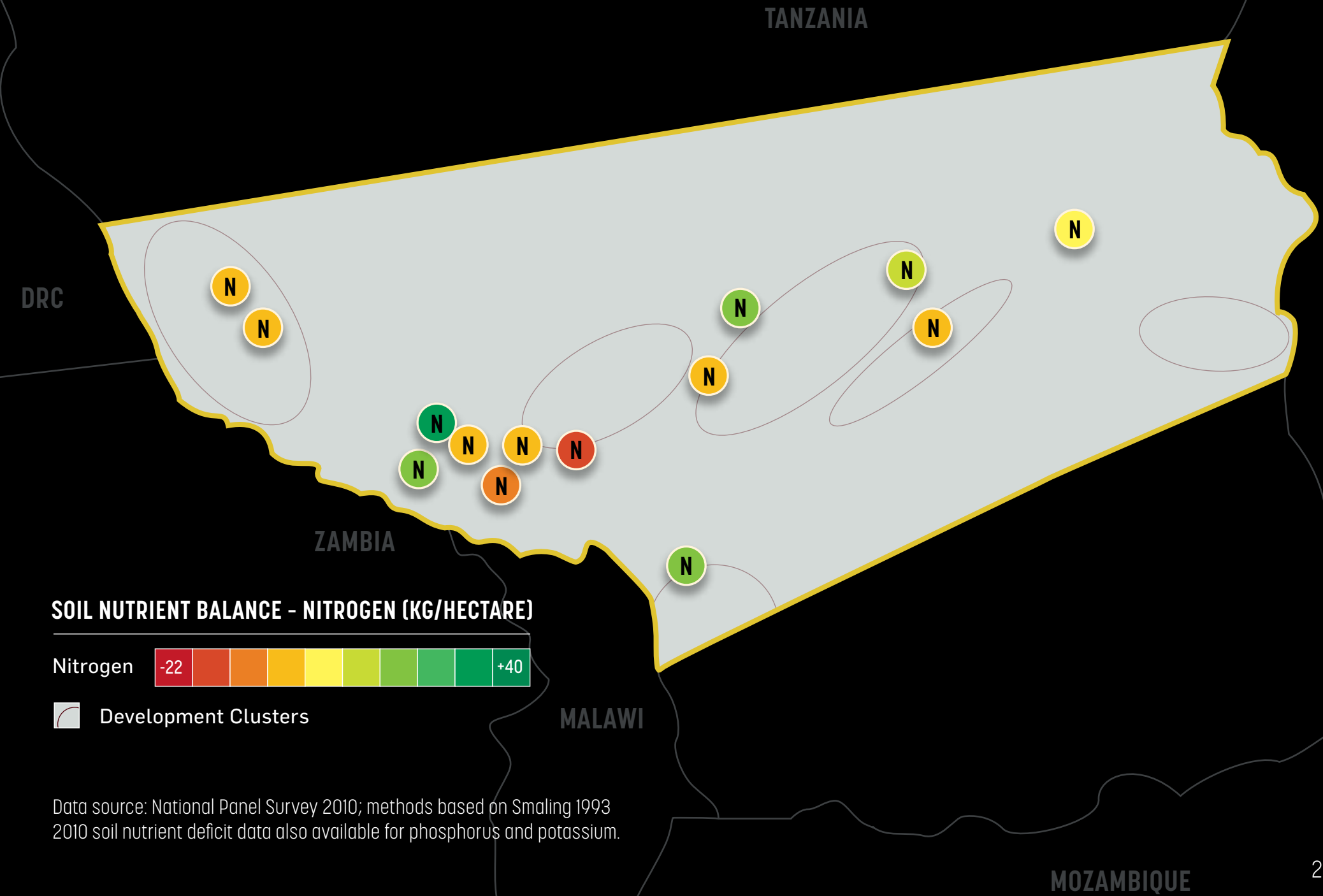
Data source: CMORPH. Annual, long and short wet season rainfall data available for 2003-2012.

ABILITY TO GROW CROPS

Farmers rely on soil fertility to produce food crops. Soil nutrient mining is one of the leading causes of land degradation in the corridor. Integrated soil fertility management is needed to reduce needs for chemical fertilizer and increase carbon sequestration.

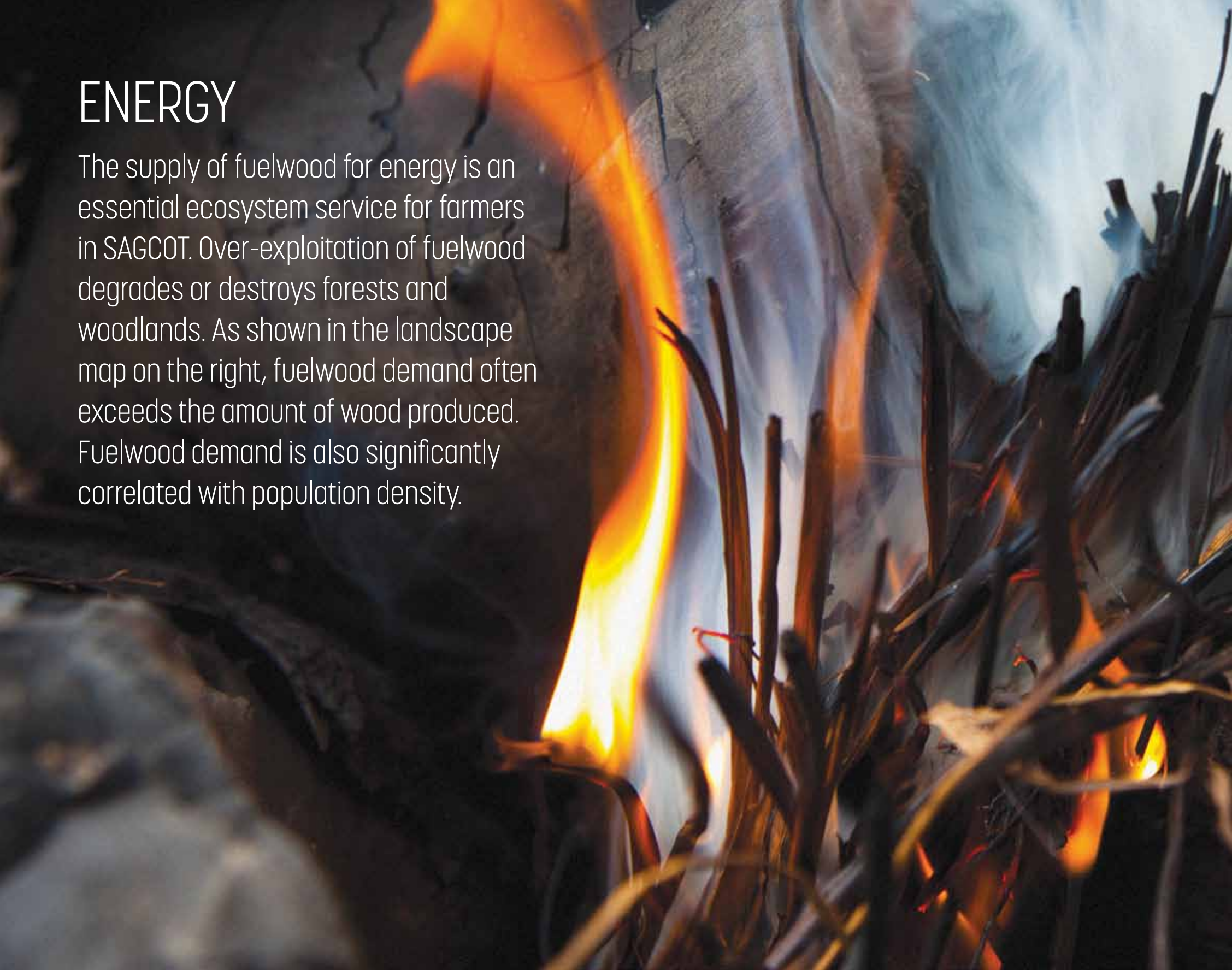


2010 SOIL NUTRIENT DEFICIT - NITROGEN

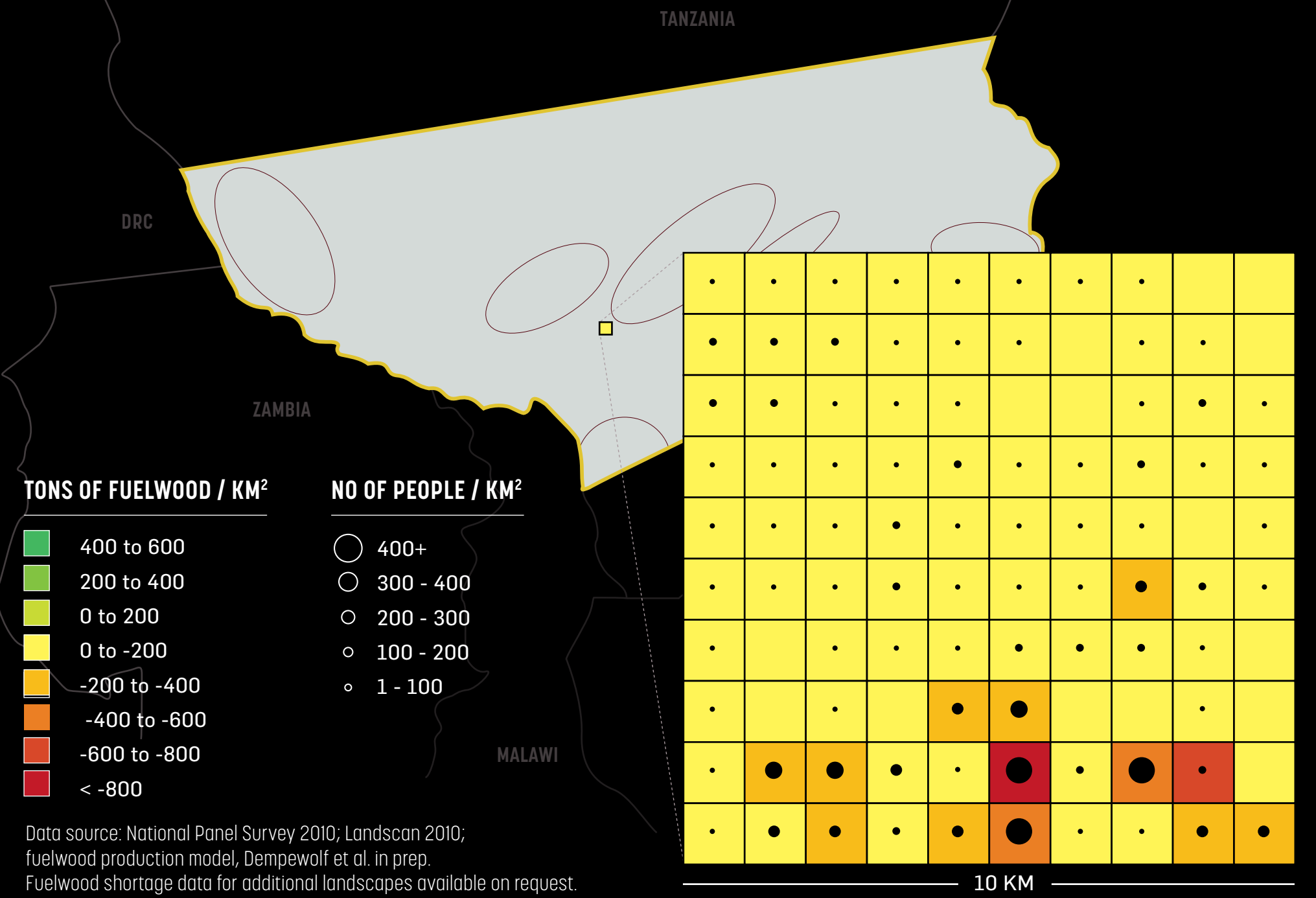


ENERGY

The supply of fuelwood for energy is an essential ecosystem service for farmers in SAGCOT. Over-exploitation of fuelwood degrades or destroys forests and woodlands. As shown in the landscape map on the right, fuelwood demand often exceeds the amount of wood produced. Fuelwood demand is also significantly correlated with population density.



2010 FUELWOOD SHORTAGE



Accounting For Nature's Value

The value of nature and its services—water, soil, wild food sources and energy—must be measured and factored into decision-making. Without these benefits from nature, farmers would essentially need to double their incomes to achieve the same level of well-being.



SUSTAINABILITY CANNOT BE AN AFTERTHOUGHT

If we continue to use only two metrics of success for agricultural development—crop yield and income—growth is unlikely to be sustainable.

While goals for increasing yield and income are critical, they don't give us the whole picture. Nature is integral to human well-being, and should be included in measures of success for SAGCOT and for related initiatives such as Grow Africa and the New Alliance for Food Security and Nutrition.

Sustainability requires a systems-level approach to decision-making and management. To measure and monitor the success of agricultural development from

a systems perspective, we need an integrated set of metrics and indicators that reflect the interconnectedness of food security, water security, climate security, ecosystem health and human well-being.

To address this critical need, Vital Signs was developed with funding from the Bill & Melinda Gates Foundation.

VITAL SIGNS

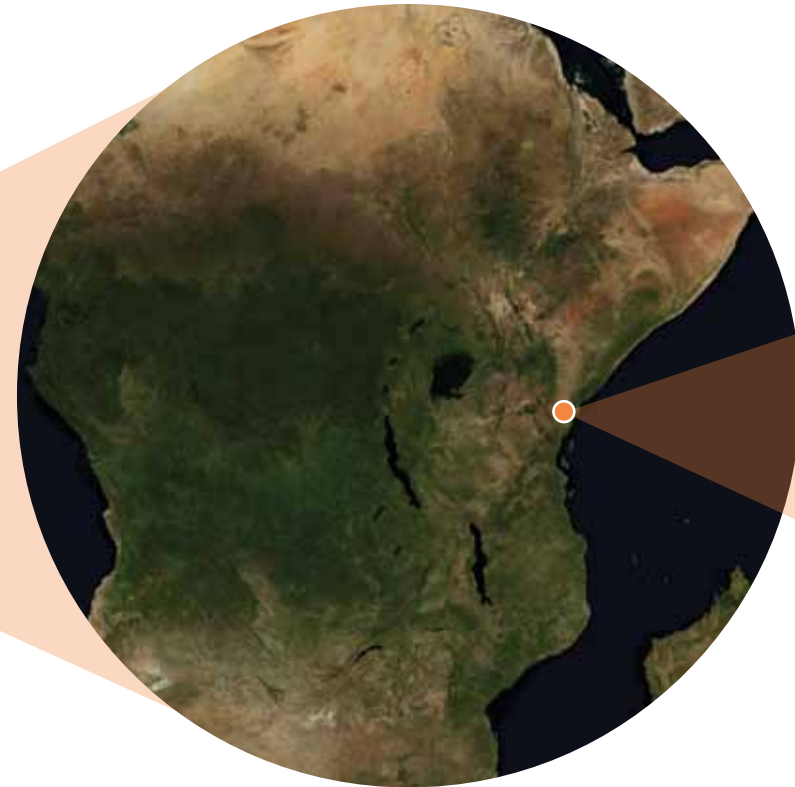
VITAL SIGNS OPERATES AT THREE LEVELS





GLOBAL

Facilitating comparisons among different regions.



REGION

Providing insights and information at the scale on which agricultural investment decisions are made.



LANDSCAPE

Measuring the relationships between agricultural intensification, water availability, soil health and other ecosystem services together with human well-being.



PLOT

Tracking agricultural production, including which seeds go into the land, what fertilizer is used and what crop yields they deliver.



HOUSEHOLD

Using surveys on health, nutritional status, income and assets.

MEASUREMENT SCALES

Vital Signs makes consistent measurements at a range of scales to provide information that is useful at all decision-making levels.

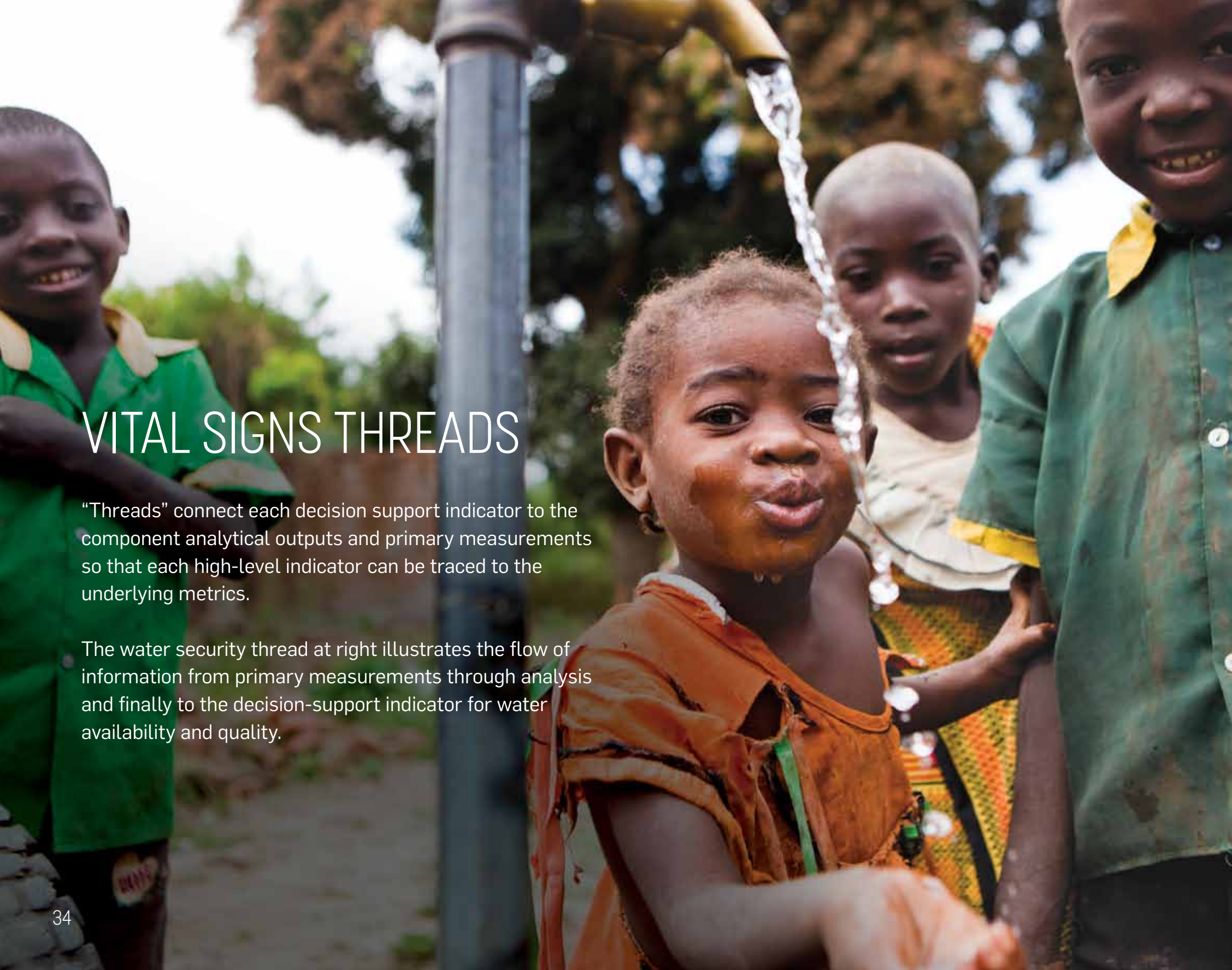
VITAL SIGNS METRICS

Vital Signs focuses on robust metrics that are relevant for sustainability. A sampling of these data appears on the preceding pages.



VITAL SIGNS DECISION-SUPPORT INDICATORS

DECISION-SUPPORT INDICATORS	AGRICULTURE	HUMAN WELL-BEING	ECOSYSTEM SERVICES
Local food sufficiency index	●	●	●
Adequate water supply	●	●	●
Biodiversity health index			●
Climate forcing	●	●	●
Inclusive wealth	●	●	●
Resilience	●	●	●

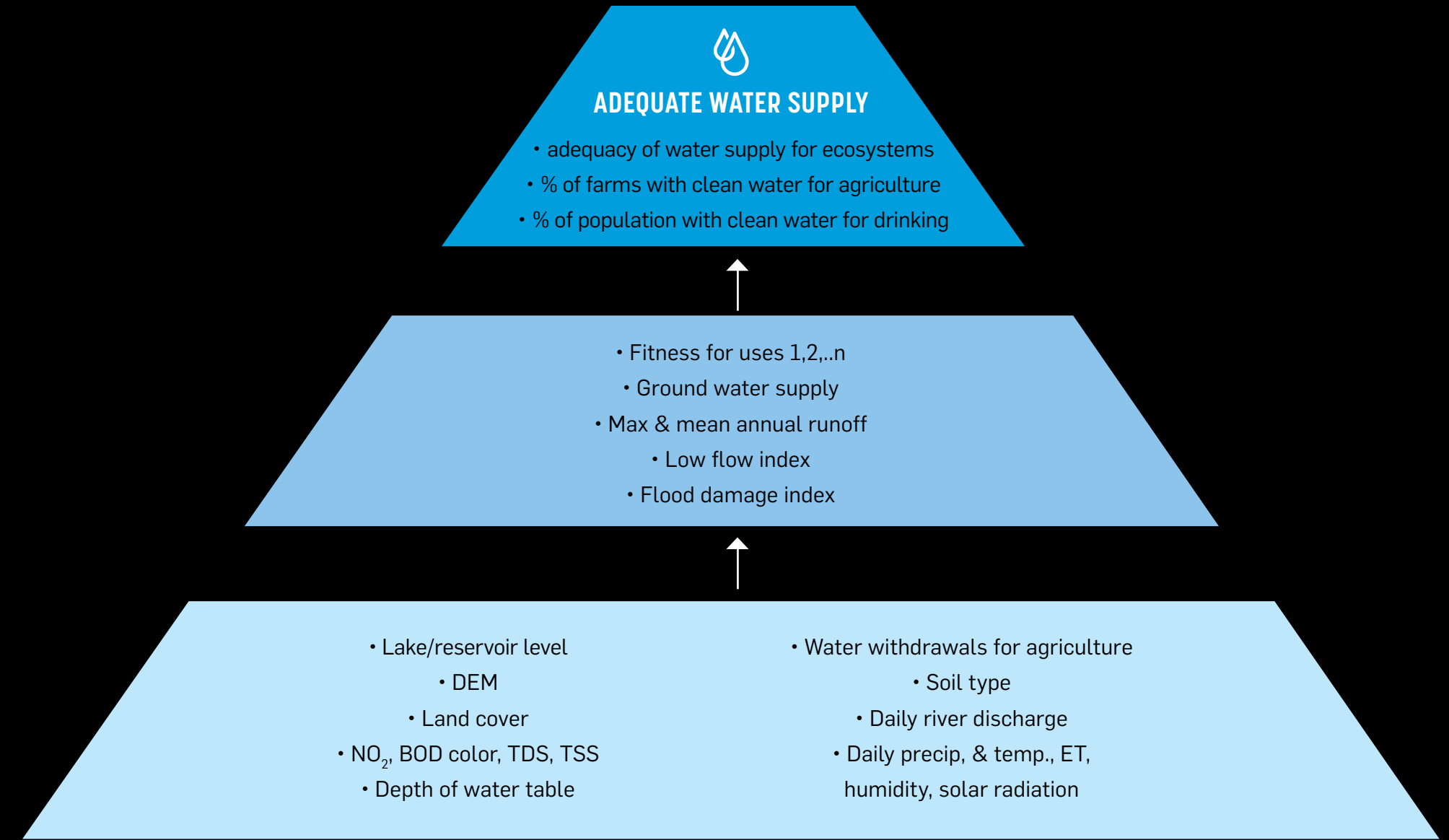


VITAL SIGNS THREADS

“Threads” connect each decision support indicator to the component analytical outputs and primary measurements so that each high-level indicator can be traced to the underlying metrics.

The water security thread at right illustrates the flow of information from primary measurements through analysis and finally to the decision-support indicator for water availability and quality.

WATER SECURITY THREAD



KEY

BOD = Biochemical oxygen demand
DEM = Digital Elevation Model

ET = Evapo-transpiration
NO₂ = Nitrogen dioxide

TDS = Total dissolved solids
TSS = Total suspended solids

WHAT DOES IT COST?

The cost of an agricultural development decision-support tool for a region the size of SAGCOT is

\$230K

Which is

0.02%

of target annual SAGCOT farming revenues.

Vital Signs: Given what's at stake, can we afford NOT to do it?





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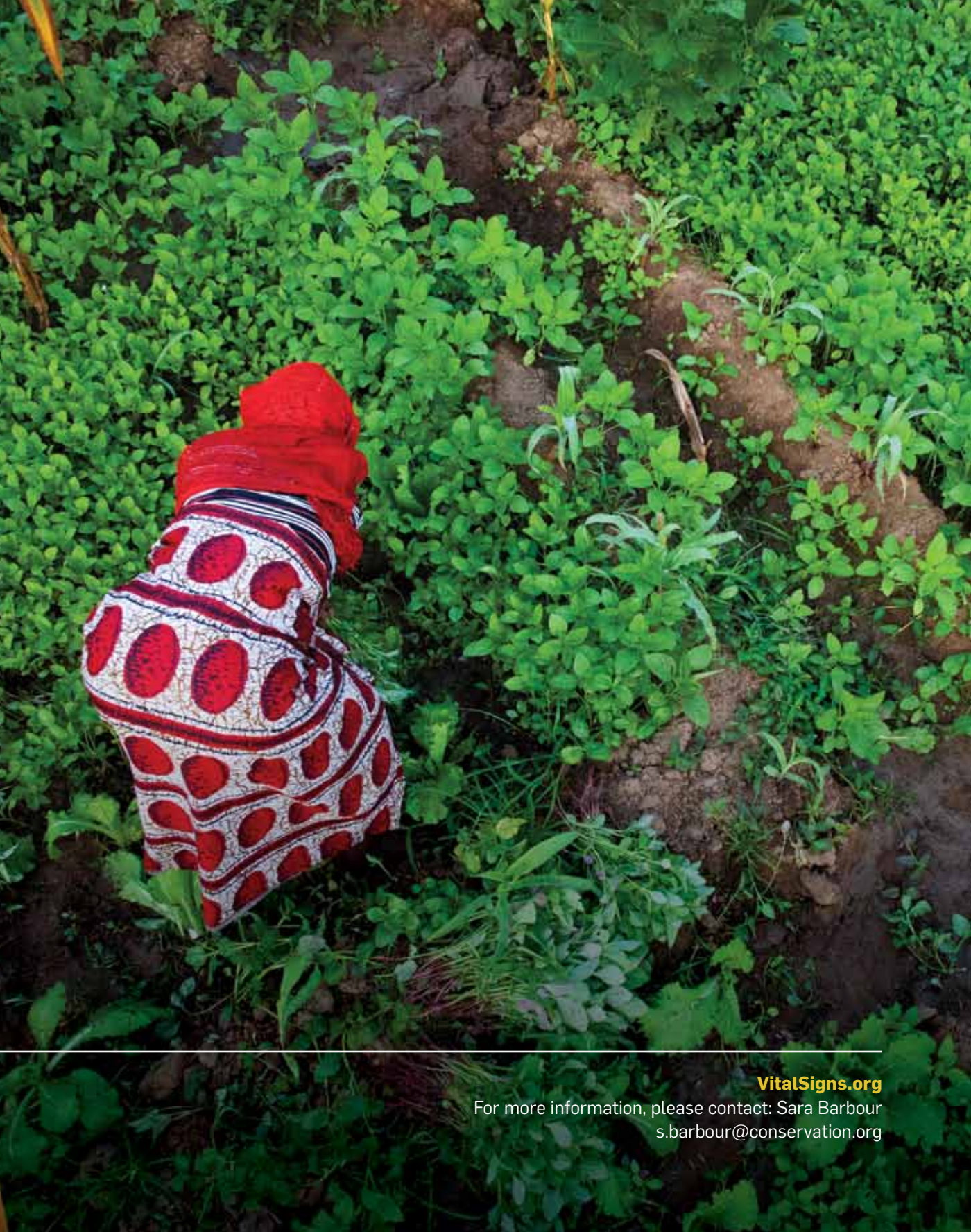
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VitalSigns.org

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