New Horizons for the Transitioning of our Food System: Connecting Ecosystems, Value Chains and Consumers

NewForesight

COMMONLAND
4 RETURNS FROM LANDSCAPE RESTORATION

January 2017

Introduction to this report

A transition towards sustainable food systems as part of healthy ecosystems will be an essential prerequisite to meet the Sustainable Development Goals.

The authors and contributors to this report feel that despite the ground-breaking work that has been done over the past decades, the transition of our food systems is not proceeding fast enough.

In this report we will argue that the food transition is not only a challenge, but offers significant opportunities for businesses, farmers, society and the planet. These opportunities can be captured if we change our core approach to sustainability from fragmented, reductionist efforts to combat negative impacts to holistic programs to capture *net positive* business opportunities.

In this report we will sketch a first outline of these holistic approaches. The main aim of this report is to trigger key decision makers in business, government and society to apply such holistic approaches and drive systemic change in our food systems at scale. The authors, and their respective organizations, are prepared to engage with decision makers and make the food transition a reality.

This report has been prepared by a joint team from NewForesight and Commonland with contributions from The Boston Consulting Group. They have done this on their own initiative, without sponsorship from any outside organization.

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Key messages of this report (I/III)

Fixing our food system based on healthy ecosystems is a fundamental pre-requisite to meeting the Sustainable Development Goals (SDGs);

In doing so, four **'brutal facts'** need to be addressed:

I. **Poverty**: over 75% of all farmers globally are caught in a poverty trap;
II. **Environmental degradation**: today's food system exceeds most planetary boundaries[1], and contributes a quarter of greenhouse gases;
III. **Food waste**: 30 to 40% of all produced food is wasted;
IV. **Malnourishment**: half the world population is malnourished (hunger, nutrient deficiencies and/or overweight);

We identify tremendous, as-yet **untapped value** from fixing our food systems, from the soils to plate, for all stakeholders as well as for our planet:

- Professional farmers who are willing and able to change can capture a significant part of that value;
- Companies across the food value chain should innovate, invest, and collaborate to capture part of that value and to enable farmers to capture their fair share;
- Actors ranging from government, finance, knowledge institutes and NGOs all have crucial enabling roles to play;
- Significant potential to mitigate climate change through carbon sequestration and GHG output reduction through improved agricultural methods

1. Most notably on land use change, freshwater, nutrients (nitrogen, phosphorus) , novel entities (pesticides, antibiotics, hormones), climate/GHG emissions and biodiversity

Key messages of this report (II/III)

To realize these benefits, a systemic change is required at three interrelated levels:

I. **Production Landscapes**: Drive development of strong rural economies and local communities on resilient landscapes, based on *net positive*[1] and restorative agroforestry and agriculture production models;

II. **Value chains**: Create net positive business models that compete on differentiated quality (e.g. taste, nutrition) in the agricultural steps of the value chain;

III. **Consumer end markets**: Enable and incentivize consumers to make healthy and sustainable choices.

Achieving these systemic changes requires a shift in approach to drive sustainability:

- **From** today's reductionist efforts to fight negative impacts in a piecemeal way…
- … **Towards** long-term holistic programs that connect actions at the three levels

1. *Net Positive* means that business puts back more into society and environment than it takes out (source: Forum for the Future)

Key messages of this report (III/III)

In recent years, many positive initiatives—from both established and new stakeholders—have got underway. To catalyze the transition and achieve impact at scale, there is a need to form *coalitions of the committed* to drive progress towards net positive food systems.

These coalitions should focus on transforming related combinations of agri-landscapes, value chains and consumer markets. Successful coalitions will:

1. Bring together a representative set of stakeholders for the agri-landscapes, value chains and consumer markets in scope;
2. Dare to invest in collaborative learning by 'joining the dots' across their chosen value chain;
3. Identify and pursue the opportunities for growth and value creation offered by this approach.

Members of these coalitions will be rewarded with faster growth and value creation than stakeholders who do not (yet) feel the urgency nor recognize the far-reaching opportunities to be had from transforming the food system.

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Nine (at least) of the SDGs can only be achieved if food systems become structurally sustainable

Remaining eight SDGs are also indirectly related to food systems

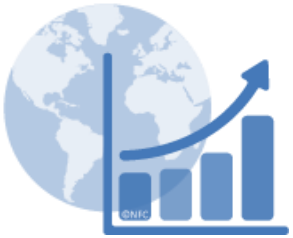
Source: Food Systems and Natural Resources (UNEP/IRP/PBL 2016)

Four brutal facts need to be addressed

Malnutrition affects more than half of today's population

In total around 4 billion people — more than half the population — are malnourished:

- Nearly 800 M people are hungry, over 2 billion people suffer from micronutrient deficiencies
  - → 3.1 M children under 5 die and 161 M left stunted every year
- 1.4 billion people worldwide struggle with overweight and obesity
  - → Changing lifestyles and cheap calories mean many people find it hard to balance their diets and lifestyles
- Unhealthy diets cause a host of fatal diseases, including heart- and kidney failure, diabetes, and cancers, particularly of the digestive tract



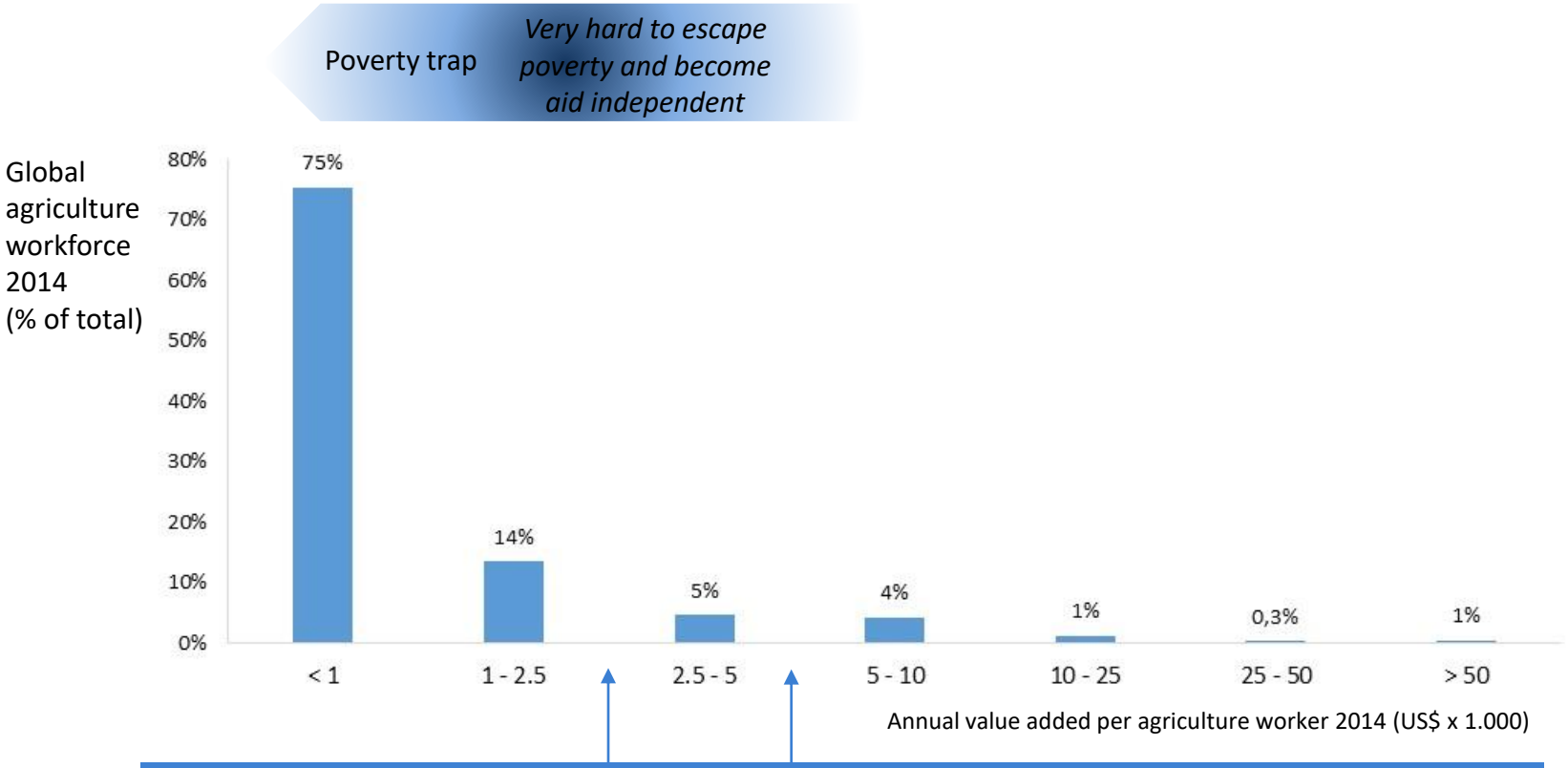
…and world population is expected to grow to 10 billion by 2050:

- This requires an estimated 70% increase in available nutrition for consumption
- The growth in demand for animal protein is projected to be higher than demographic growth

Source: 'Food Systems and Natural Resources'(UNEP/IRP, 2016), Global Alliance for Improved Nutrition (GAIN), FAO, WHO, Unicef, 'Towards a Common Agricultural and Food Policy' (Poppe and Fresco, 2016), 'Disease-related Malnutrition: An Evidence-based Approach to Treatment' (Stratton, Green and Elia, 2003)

>75% of agricultural workers are extremely poor

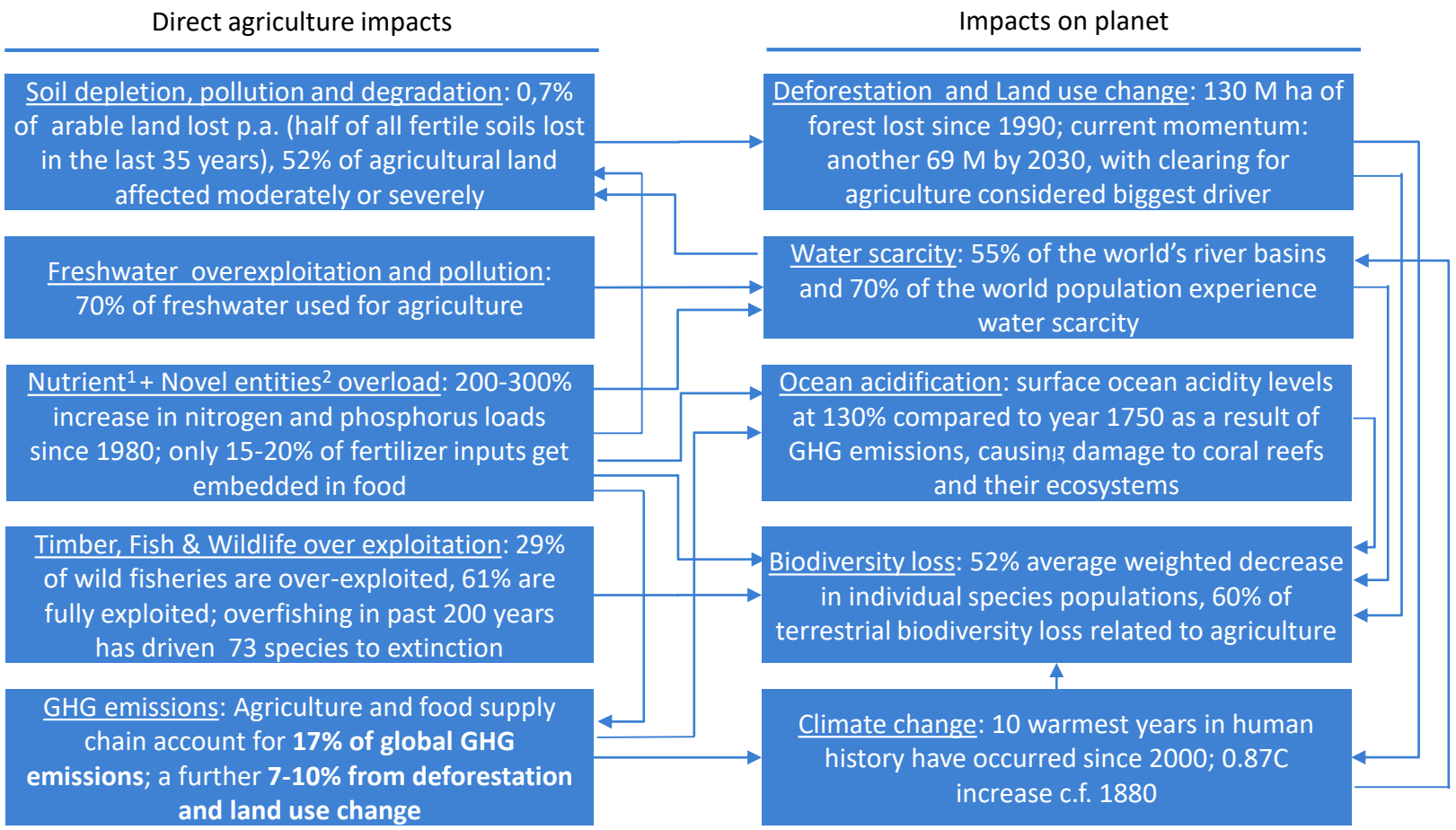
Global distribution of agricultural labor, by level of value added



- World Bank poverty line ($2 p.d.) translates to app. $2,500 p.a. per family
- Note that minimum income often is less than living income, and value added does not cover financing costs; arguably $5,000 value added p.a. is minimum to escape poverty

Source: NewForesight analysis of World development indicators (World Bank)

Overwhelming evidence that global food systems exceed planetary boundaries, with risk of acceleration

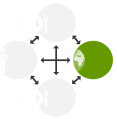


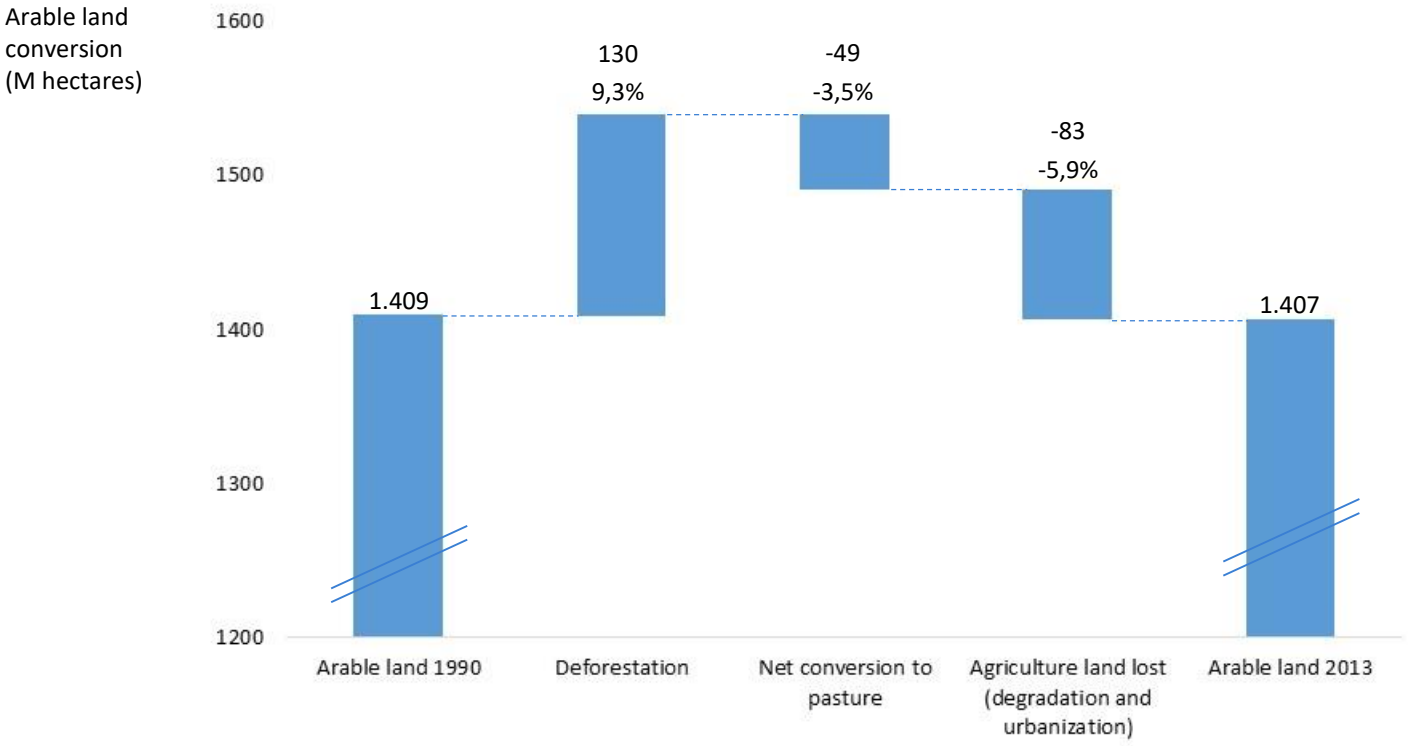
1) Primarily Nitrogen and Phosphorous through synthetic fertilizers

2) Pesticides, Antibiotics, Hormones

Sources: Stockholm Resilience Center; UNEP/IRP/PBL 2016: 'Food Systems and Natural Resources'; WWF/Metabolic 2016: 'Global Food System, an analysis'; WWF 2014: 'Living Planet Report 2014'; D e Vos, J. M.et al. (2015), Estimating the normal background rate of species extinction. Conservation Biology, 29: 452–462. Hoekstra and Mekonnen 2011: Global water scarcity: The monthly blue water footprint compared to blue water availability for the world's major river basins. NewForesight Analysis

Despite deforestation the global amount of arable land is flat

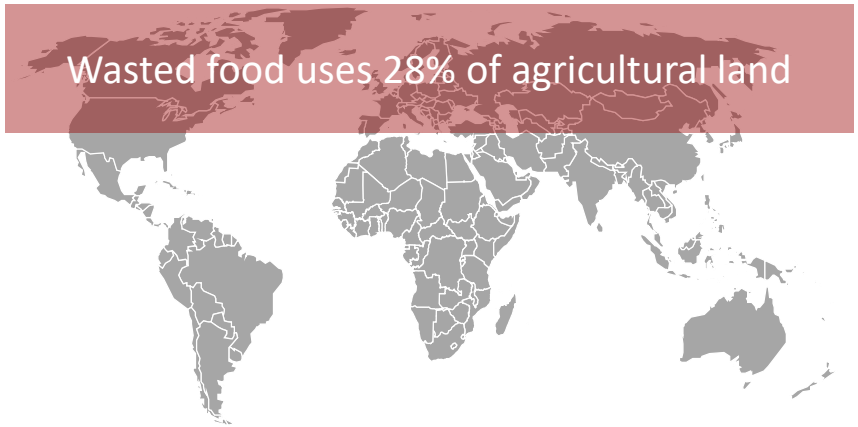




Source: NewForesight analysis of World development indicators (World Bank)

30-40% (1.3B MT) of produced food is wasted every year

In developed countries, mostly by consumers and in foodservice



In developing countries, due to poor technologies (harvesting, transport and storage), long distances to processing facilities and poor management

Source: "Global food losses and food waste: Extent, causes and prevention". FAO, 2011; "Review of EU legislation and policies with implications on food waste". Vittuari etal. 2015, 'Towards a Common Agricultural and Food Policy' (Poppe and Fresco, 2016). FAO, 2013: "Food Wastage Footprint: Impacts on Natural Resources"

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Six root causes need to be addressed to achieve systemic change

Consumer end markets

Agri Value chains

Agriculture Production Landscapes

6 Distorting tax systems, subsidies and other regulations hamper systemic change

5 Consumers disconnected from food production lack the knowledge and price- or quality incentives to make healthy and sustainable choices

4 Food supply chain actors compete primarily on standardization and lowest price of agricultural commodities and hardly ever on differentiated quality (taste, nutritional value, ecosystem services[1]) in primary production

1 94% of farmers subscale and caught in poverty trap

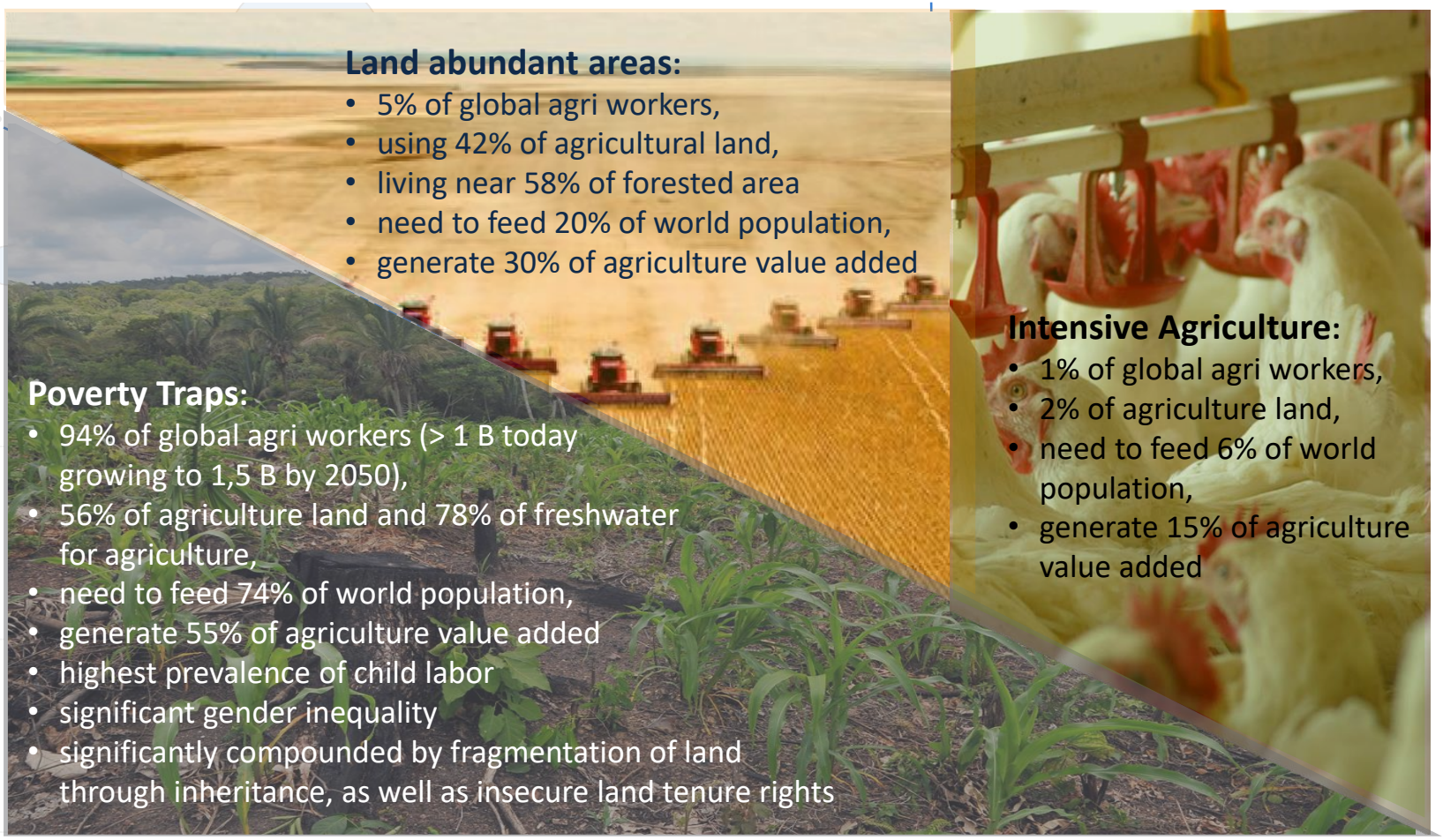
2 5% of farmers incentivized to treat 42% of land as abundant resource

3 1% of farmers incentivized for over - intensification via externalized costs

1. Generally, 'ecosystem services' are "the benefits people obtain from ecosystems" (Millennium Ecosystem Assessment, 2006). Within this, one can identify 'habitat services' and 'ecosystem functions', as "a subset of the interactions between ecosystem structure and processes that underpin the capacity of an ecosystem to provide goods and services" (TEEB 2010:19), such as sustained production capacity, carbon sequestration, freshwater and biodiversity.

Three agricultural landuse archetypes

Farmsize:
Hectares per farmworker (avg. 2010-15)

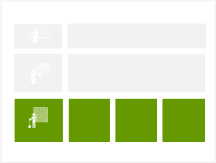


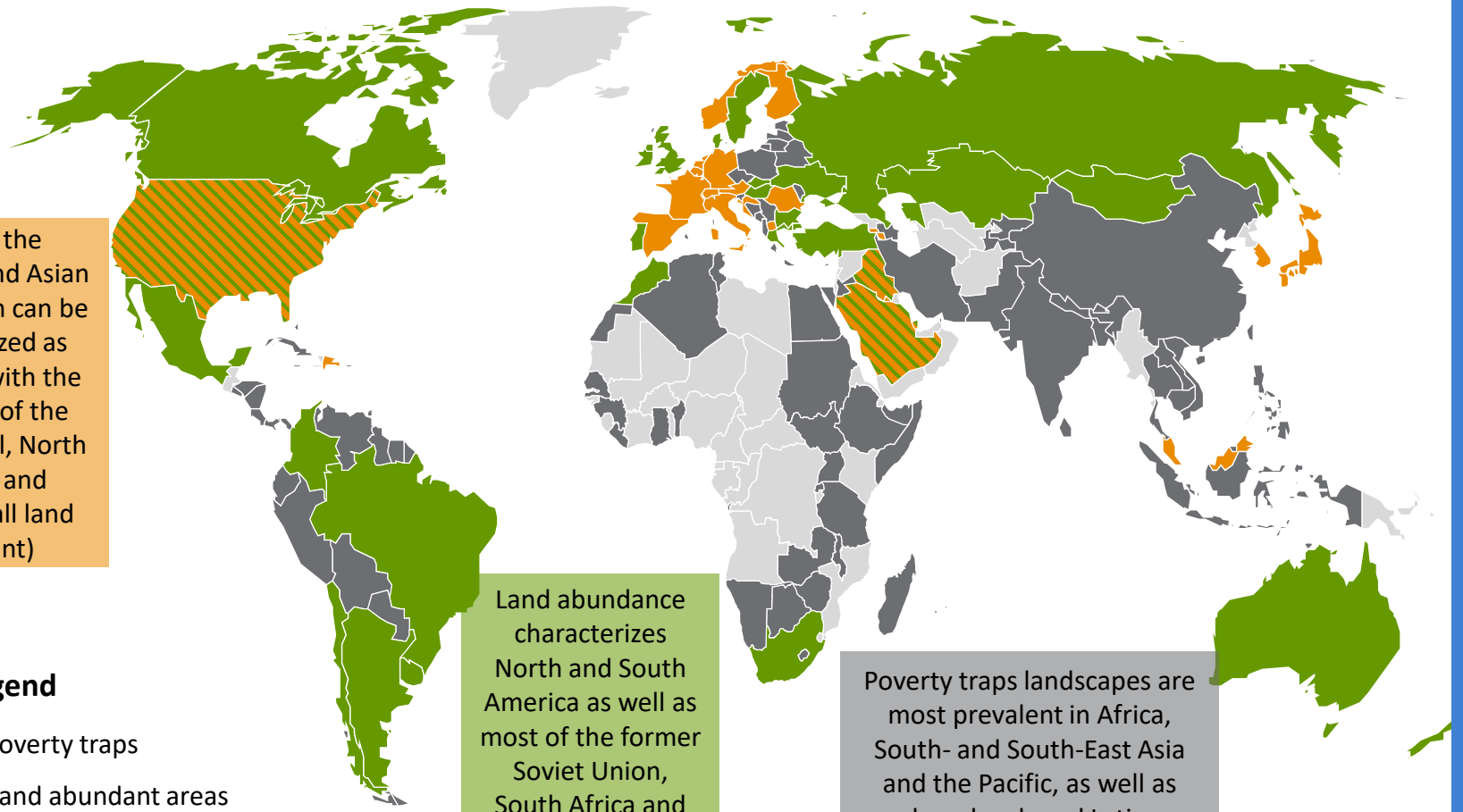
Note: all numbers are country averages that may mask huge in-country variability

Land Productivity:
Value added per Hectare per annum (US$ avg 2010-15)

Source: NewForesight analysis of World development indicators (World Bank)

The three archetypes are distributed around the globe reflecting economic development





Most of the European and Asian OECD region can be characterized as intensive, with the exception of the UK, Portugal, North America and Australia (all land abundant)

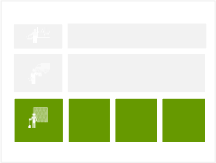
Land abundance characterizes North and South America as well as most of the former Soviet Union, South Africa and Australia.

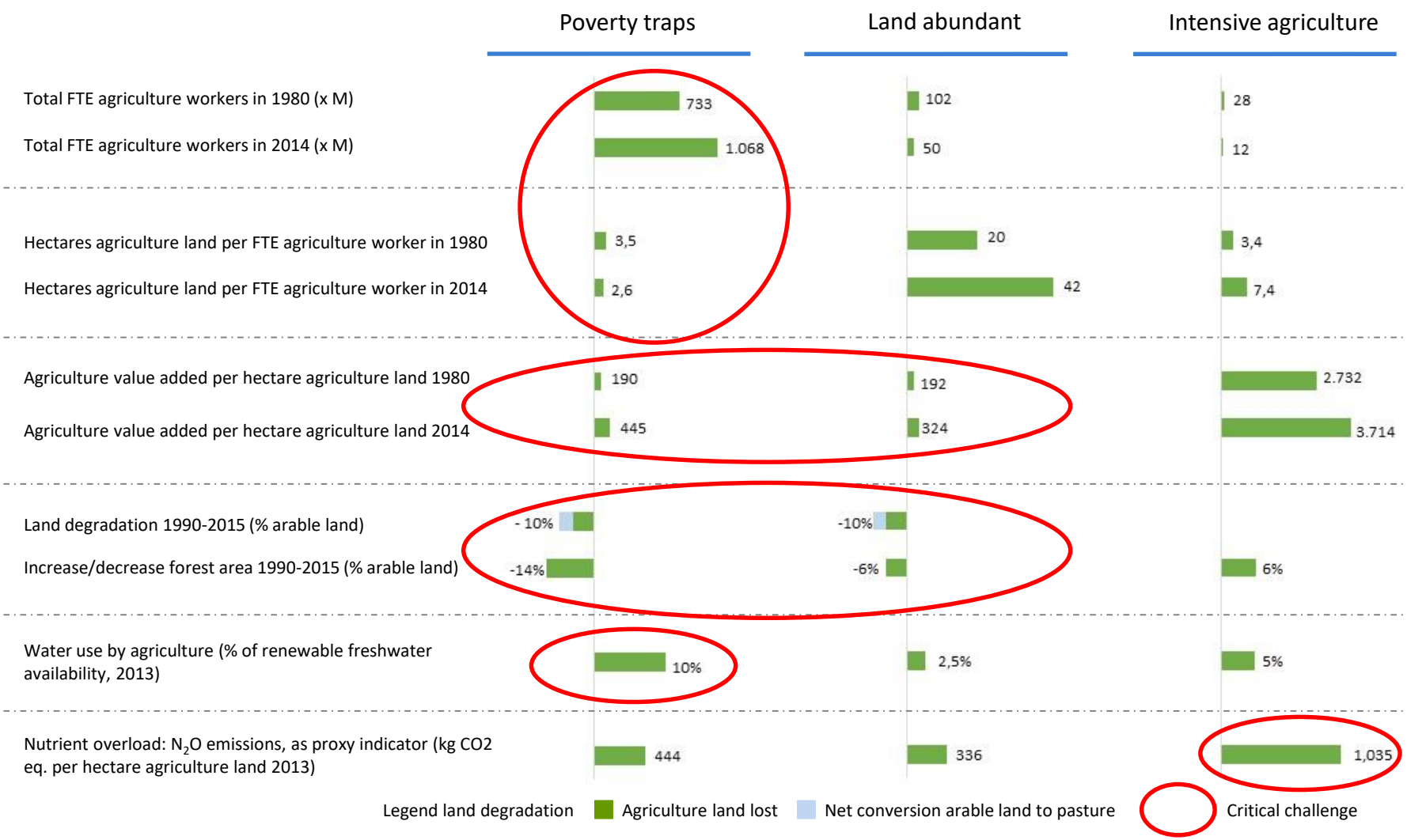
Poverty traps landscapes are most prevalent in Africa, South- and South-East Asia and the Pacific, as well as less developed Latin American and Eastern European countries.

Legend

- Poverty traps
- Land abundant areas
- Intensive agriculture
- Land abundant with pockets of intensive agriculture
- Not enough data

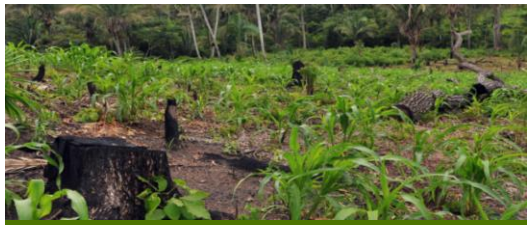
Challenges differ substantially between archetypes





Source: NewForesight analysis of World development indicators (World Bank)

Change opportunities differ by land usage archetypes



	Poverty trap areas	Land abundant areas	Intensive agriculture
Today's challenges	Growing population caught in poverty trap, and poor farming practices; often leading to de-forestation, soil degradation and water depletion	Under-utilization of agriculture land, often combined with high deforestation and soil degradation	High externalized costs (e.g. too much inputs, nutrient overload, low biodiversity) from maximized yields
Required game change	• Ecologic intensification and degraded land restauration needed to stop deforestation, including protected areas • 600 M farmers need to grow and professionalize • 850 M alternative livelihoods to replace subsistence farming, and accommodate population growth	• Ecologic intensification (intercropping, precision agriculture) needed to stop deforestation and soil degradation • Rewilding of land that is not needed for agriculture	• Ecologic optimization and value growth (differentiate on taste and nutritional value) needs to win against continued yield maximization with high externalized costs

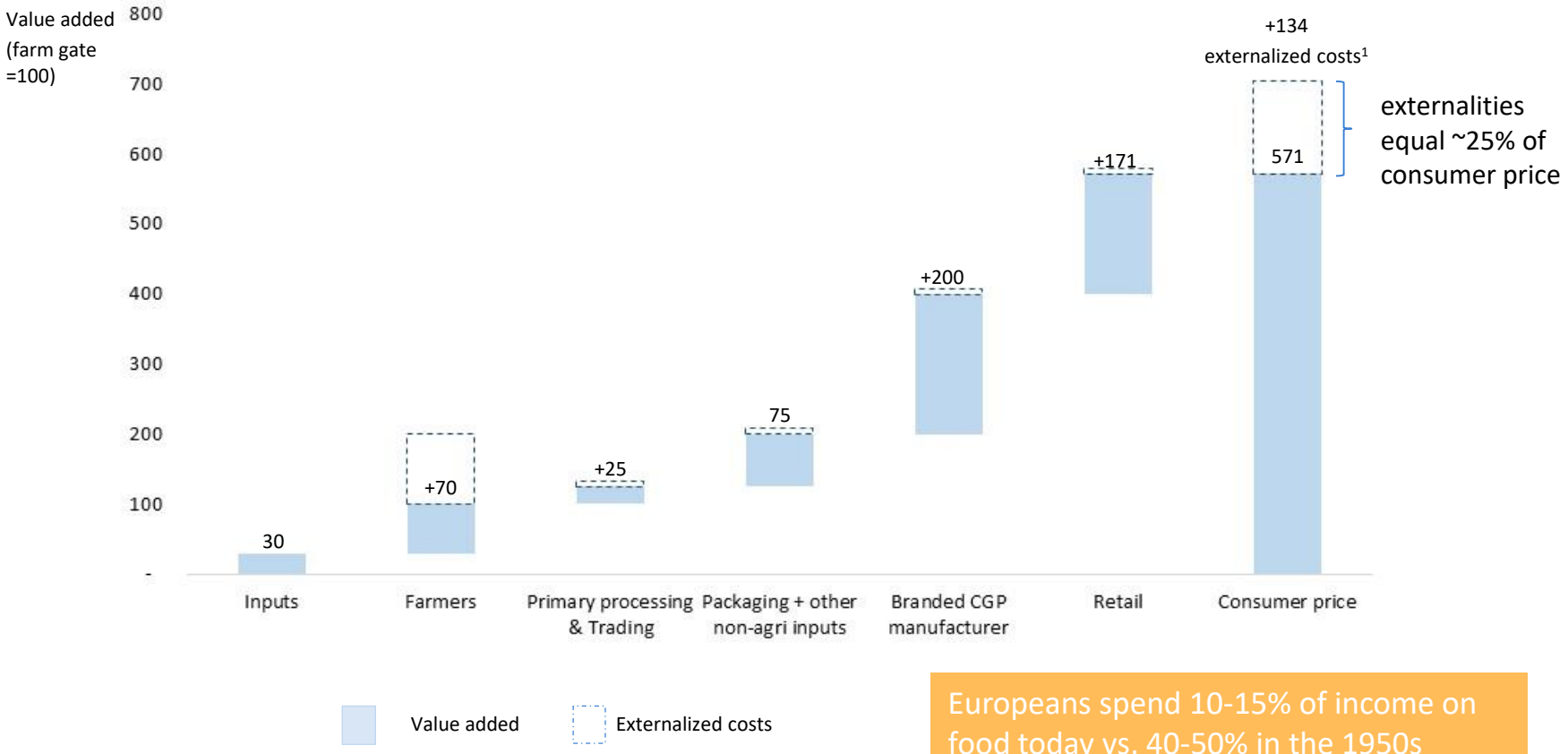
…and for different players across the value chain

	Input suppliers	Traders & Primary processers	Consumer products producers	Retailers
Today's dominant business logic	• Standardization • High volumes • Patented innovation[1]	• Standardization • Efficiency and lowest prices	• Standardization of input • Low sourcing costs	• Low price perception • High volumes
Sustainable business opportunities	• Support farmers in optimizing soil and ecosystem health and long term value • Low volumes, precision inputs • Diversity of inputs, tailored to local needs	• Support farmer communities in optimizing rural economies and ecosystems • Differentiate on access to local varieties	• Market differentiated taste and nutritional value of sustainably produced food at true price	• De-commoditize: Promote differen-tiated taste and nutritional value of healthy and sustainable diets at true price • Maximize local sourcing
Economic potential	**Responsible consumer products account for two thirds of grocery market growth at an average price premium of 20-25%; retailers benefit from 30-40% price premiums vs. conventional own label products, and consumer goods companies benefit from a 10-20% price premium[2]**			

1. Such as seed stocks
2. Smits, Marty et al. 2014 "When Social Responsibility Leads To Growth" The Boston Consulting Group

Externalization of social and environmental costs distorts consumer price and hampers sustainable choices

True Price on average ~25% above actual price



Europeans spend 10-15% of income on food today vs. 40-50% in the 1950s

Source: Trucost, Annual reports of processors, traders, FMCG producers and retailers, NewForesight experience and analysis

1)Based on calculations of Trucost in 2012: Externalized costs add up to 224% of EBITDA of food companies. 75% of these externalities assumed to be in the agriculture landscape, remaining 25% assumed to be evenly split over the subsequent steps in the value chain, 'Towards a Common Agricultural and Food Policy' (Poppe and Fresco, 2016)

Systemic change opportunities in consumer behavior

Today's consumers not in a position to demand sustainable food production

- Lack **awareness** of the issues constraining our food systems
- Unsustainable choices are **cheaper** because externalities are not priced in;
- Limited experience of quality differences of locally produced food
- Unsustainably produced empty calories often more attractive than sustainably produced, nutrient rich food
- Question and mistrust credibility of multiple 'sustainability' certifications (often rightfully so)
- Urbanization (80% of world population by 2050) drives intensified consumer demands and value chain concentration

Required changes in consumer behavior

<u>In developed markets:</u>

- Consume less empty calories, less meat
- Consume more locally produced food
- Rise in urban farming & 'citizen science'
- Demand sustainable production and pay true prices (~25% higher than today)
- Reduce food waste
- Facilitated by a changed food environment (clearer information and regulation)

<u>In developing markets:</u>

- Less empty calories
- Moderate growth of animal proteins
- Stick to locally produced food as much as possible
- Facilitated by investment in local supply chains to ensure sustainable, affordable locally produced diets

Source: Poppe and Fresco, 2016: 18; De Wilde, 2015: 91; NewForesight analysis

Systemic change opportunities in tax systems, subsidies and other regulations

Distortive tax systems, subsidies and regulations hamper systemic change

- Externalities[1] not taxed
- Many subsidies reward unsustainable practices and distort competition in global commodity markets
- Too easy to obtain permits for unsustainable practices or even illegal business practices
- Too difficult to introduce innovative business models that improve sustainability
- Competition laws sometimes prevent collaboration needed to end unsustainable practices

Required changes in government policies and regulations

National food policies that holistically address local and global system failures

Outlaw practices that fail to meet minimum standards

Price in externalities (on average 25% of consumer price) of conventional unsustainable business models, by introducing/increasing taxes on:

- GHG emissions, chemical inputs, soil and freshwater depletion, irresponsible sourcing from poverty areas
- Consumption of unsustainably produced food

End distortive volume based subsidies for inputs and for agri production

Use the generated funds to:

- Co-invest with private sector in landscape restoration and sustainable community development,
- Pay for ecosystem services that cannot be sold to private sector,
- Co-invest with private sector in pre-competitive R&D[2] towards net-positive business models,
- and/or lower taxes on labor

1) Externalities are harmful consequences of economic activity that are not reflected in price

2) Pre-competitive R&D refers to industry collaboration for innovation by companies that are otherwise competitors

Source: Poppe and Fresco, 2016: 31, 42-49; NewForesight analysis

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Continuous improvement at sufficient speed can create sustainable food systems and fulfill the SDGs

Potential results in 2030-2050

- Enough healthy and nutritious food accessible for everyone
- Reduction of farmers in poverty (value added < US$ 2,500) from >1B today to <600 M by 2030, to 0 by 2050
- End to deforestation and conversion of wetlands by 2020; convert land back to nature where possible
- Doubling of global agriculture value added; farmer income growth in all areas
- 400 M alternative livelihoods[1] by 2030 and 850 M by 2050, generating economic growth outside agriculture
- Food systems operate within all planetary boundaries globally and locally

Required annual improvements	Poverty trap areas	Land abundant areas	Over intensified areas
Productivity growth per hectare	1,2%	1,0%	-0,2%
Reduction of food waste		-1,0%	
▲ value added per hectare	2,7%	2,4%	1,0%
▲ hectares for agriculture	0%	-1,4%	0%
▲ number of farmers	-1,6%	-0,1%	-0,5%
▲ nutrient load per hectare	tbd[2]	tbd[2]	-2,5%
▲ freshwater usage per hectare	tbd[2]	tbd[2]	tbd[2]
▲ biodiversity & ecosystem functions	tbd[3]	tbd[3]	tbd[3]

1. To increase average farm size in poverty trap areas and make up for anticipated population growth in these areas
2. Required improvements for nutrient load can be increase in many poverty trap areas while a decrease in pockets of intensive farming within land abundant areas is required.
3. Specific local targets need to be set and an appropriate methodology to measure needs to be selected / developed

Source: NewForesight analysis of World development indicators (World Bank)

This scale of change is possible

example: Löss Plateau, China

- China's Löss Plateau – an area the size of France – was once one of the country's most fertile regions
- Overgrazing and –tilling of the soil had caused extremely high erosion
- Land became unproductive, farmers became impoverished (incomes <$70 p.a.)

- World Bank-funded erosion control and livelihood diversification program has restored area the size of Belgium
- Population is now better off:
  - –Higher employment (from 70% to 87%)
  - –Improved food security (grain output increased 62%)
  - –Increased farmer incomes (by 285%)
  - –In total, 2.5 million lifted out of poverty
- Environmental benefits include:
  - –Sediment flow into Yellow River reduced by 80%
  - –Perennial vegetation cover increased from 17% to 34%

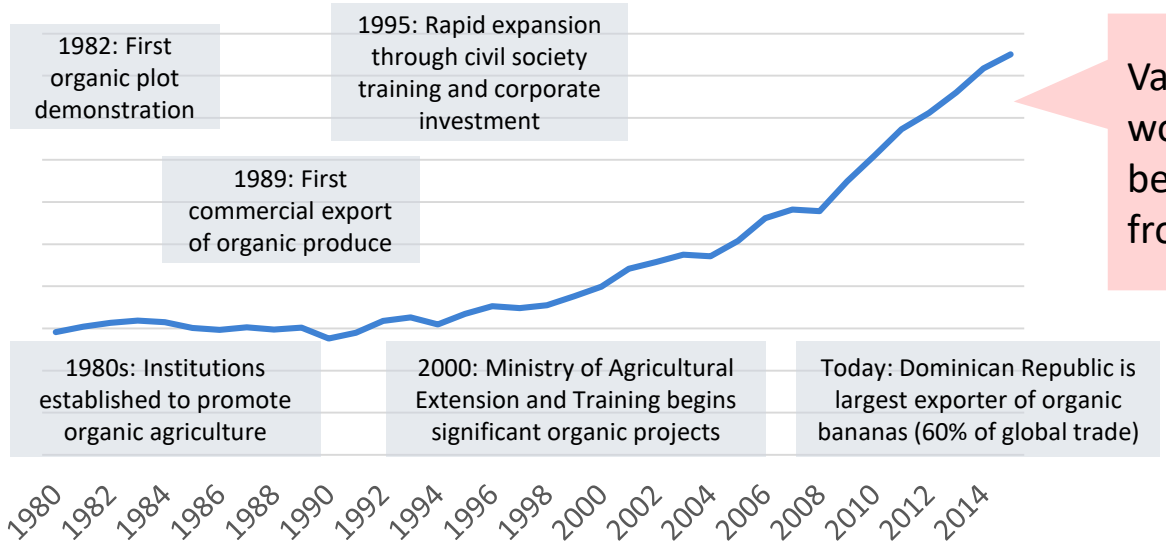
Sources: Permaculture News: "Hope for a new era: before/after examples of permaculture earth restoration – solving our problems from the ground up" (The Permaculture Research Institute, 2012); World Bank News: "Restoring China's Loess Plateau" (World Bank: 2007)

This scale of change is possible

example: Dominican Republic

Dominican Republic – developing organic sector

- Offered alternative livelihoods: from 60% of population working in agriculture in 1960 to 15% in 2014.
- In the meantime, government and businesses began to encourage diversification, professionalization, inputs and loans to enable a more efficient and profitable sector.
- An organic sector, specializing in bananas, mangos, coffee, coconut and cocoa emerged due to institutions aimed at capacity building were established between 1980 and 1995 with 14,000 farmers – one of the largest in Latin America.
- The sector was driven by demand from EU and US, strong farmer organizations and governmental policies to promote foreign investment (FAO).

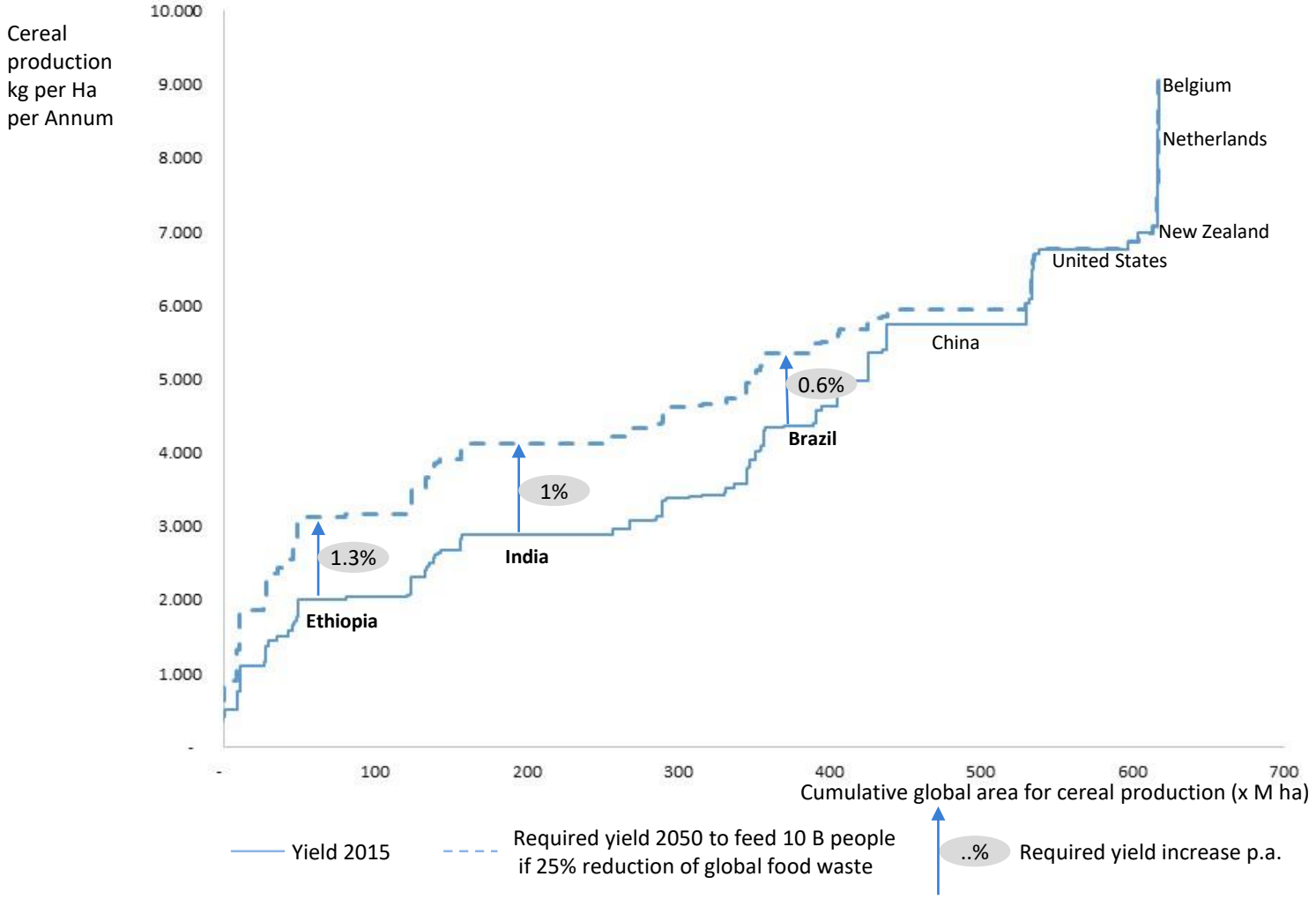


Value added per agricultural worker **more than tripled** between 1980 and 2014; from $2,915 to $9,504

Source: FAO (http://www.fao.org/docrep/004/Y1669E/y1669e0k.htm)
http://cfat.colostate.edu/wp-content/uploads/2010/06/Raynolds-2008.pdf

Modest yield increases in underutilized areas combined with waste reduction can deliver sufficient food for 10 B by 2050

example: Required growth in global Cereal production



Source: NewForesight analysis of World development indicators (World Bank)

Potential value of Food Transition is huge – some examples

Consumer end markets

- Pricing externalities (c.f. p. 25) into food represents not only cost but also value creation, with potential of $800B added to the world economy[1]
- Better protection and preservation of ecosystem services resulting from pricing in of externalities can increase the value provided by ecosystems, estimated to be up to $145 trillion per year
- Welfare states benefit from reductions in healthcare costs of up to 6%

Agri Value chains

- Responsible consumer products account for two thirds of market growth in groceries at an average price premium of 20-25%
- Retailers benefit from 30-40% price increases over own-brand conventional products, and consumer goods companies benefit from a 10-20% price premium[2]

Agriculture Production Landscapes

- Restoration can increase the economic value of ecosystems by up to 80%[3]
- Higher employment in secondary and tertiary sectors can boost GDP
- More professional farming can multiply farmer profit, particularly in poverty trap landscapes[4]
  - i.e. 140M rice producers would gain $750M from smart, water-conserving agricultural practices[3]

Source: (1) NewForesight analysis of World Bank Data; (2) Smits, Marty et al. 2014 "When Social Responsibility Leads To Growth" The Boston Consulting Group; (3) Muller, Alexander 2015 "TEEB for Agriculture & Food Interim Report", The Economics of Ecosystems & Biodiversity; (4) – NewForesight analysis of smallholder commodity sectors

Strong business case for being a sustainability front runner

Recent studies[1] demonstrate that companies who measure sustainability performance and formulate concrete sustainability goals **outperform on the stock market and experience lower stock price volatility.**

In the energy sector companies **slow in adopting** sustainable practices experience **weaker shareholder returns** than peers. A similar pattern may apply in food in the future.

Companies that formulate sustainability goals and make a switch to a holistic, sustainable business model soon can **capitalize on the untapped value in fixing our food system** that we describe earlier.

It is therefore of paramount importance not just for our common future but also for long-term business viability that companies in the food sector adopt sustainability in their business strategies.

1. E.g. Eccles et. Al 2012; red.

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We need to accelerate beyond today's mostly reductionist approaches

Despite significant investments, most transition efforts today are still in 'fire fighting' mode

- Fragmentation: many small, competing initiatives and isolated projects
- Progress is measured versus last year and relative to competitors
- Sustainability claims are based on marginal improvements
- Risk of losing credibility and being accused of greenwashing

Many transformation approaches are not holistic enough

- Optimizing only one or few dimensions at the cost of others
- Focusing on Supply Chain, Landscape or Consumers rather than all three
- Steering on inputs and processes rather than outcomes

All today's efforts combined are not enough to turn the tide in time

- At current speed it will take 50 to 100 years to reach sustainable aid-independent livelihoods for average farmer
- By then planetary boundaries will long be exceeded irreversibly

Meeting these challenges requires:

- **A holistic science based vision of production with net positive impact on people and planet**
- **A clear and economically viable approach to make net positive business models win**
- **A clear timeline to achieve net positive impact within 1-2 generations**

Need to move from piecemeal 'fighting of negative impacts' to holistic, business driven approaches, aspiring net positive impact

	Today's dominant logic	Required for systemic change
Ambition	Less Negative impacts	Net Positive impact
Scope	Supply chains, company by company, commodity by commodity	Full systems: Landscape, value chains, consumers
Breadth of solutions	Dogmatic: 'one size fits all'	Diversity of pathways
Tools	Implement (Certification) tools and process changes as objective in itself	Drive to outcomes, use supporting tools as needed

Need holistic transition agenda at three levels

To be refined and detailed for each major landscape, supply chain and consumer market

ambition

Consumer end markets

Promote healthy and sustainable diets @ *true price;* moderate on animal protein; increase link between local diets and local agriculture production

Halve downstream food waste at retail and consumer[1]

Agro Value chains

Market sustainable food production; generate willingness to pay *true price*

Clean and energy-efficient processing technologies; optimize biomass to food conversion rate

Ensure reliable supply chains for every farmer and eliminate upstream food waste

Agriculture Production Landscapes

Poverty trap areas:
- Professionalize farming
- Access to finance
- Less farmers; create alternative livelihoods

Land abundant areas:
- Ecological intensification
- better balanced inputs, more diverse cropping patterns
- Rewilding

Over intensified areas:
- Grow value, not volume
- End nutrient + novel entities overload

Develop and scale-up *net positive*[2] farmer business models that provide sustainable livelihoods

Adapt regulations, subsidies and taxations to end externalities and enable growth of net positive business models

Land and water use planning towards *climate resilient and biodiverse* agro-productive landscapes, protected areas and ecological corridors

1. As included in SDGs
2. Regenerative land use for agriculture, full circularity of Nutrients, Carbon and Energy, Farmers earn living wages + surplus to re-invest in their farm, thriving rural communities with many more sectors than primary food production

Different actors need to take the lead on specific elements of the suggested transition agenda – suggested roles

ambition

Consumer end markets

Promote healthy and sustainable diets @ *true price;* moderate on animal protein; increase link between local diets and local agriculture production

Half downstream food waste at retail and consumer

Agro Value chains

Market sustainable food production; generate willingness to pay *true price*

Clean and energy-efficient processing technologies; optimize biomass to food conversion rate

Ensure reliable supply chains for every farmer and eliminate upstream food waste

Agriculture Landscapes

Poverty trap areas:	Land abundant areas:	Over intensified areas:
• Professionalize farming • Access to finance • Less farmers; create alternative livelihoods	• Ecological intensification • Better balanced inputs, more diverse cropping patterns • Rewilding	• Grow value, not volume • End nutrient + novel entities overload

Develop and scale-up *net positive* farmer business models that provide sustainable livelihoods

Adapt regulations, subsidies and taxations to end externalities and enable sustainable business models

Land and water use planning towards *climate resilient and biodiverse* agro-productive landscapes, protected areas and ecological corridors

Retailers led; co-creation with governments

Producers and processors led for branded products; retailer led for private label or unbranded products; co-creation with governments

Government led ; co-creation with business

Government led

Need to design credible pathways to resilient landscapes with restorative agriculture methods

example: 4 Returns®, 3 Zones, 20 Years model developed by Commonland

Scope

Return of Inspiration
Giving people hope and a sense of purpose.

Return of Social Capital
Bringing back jobs, business activity, education and security.

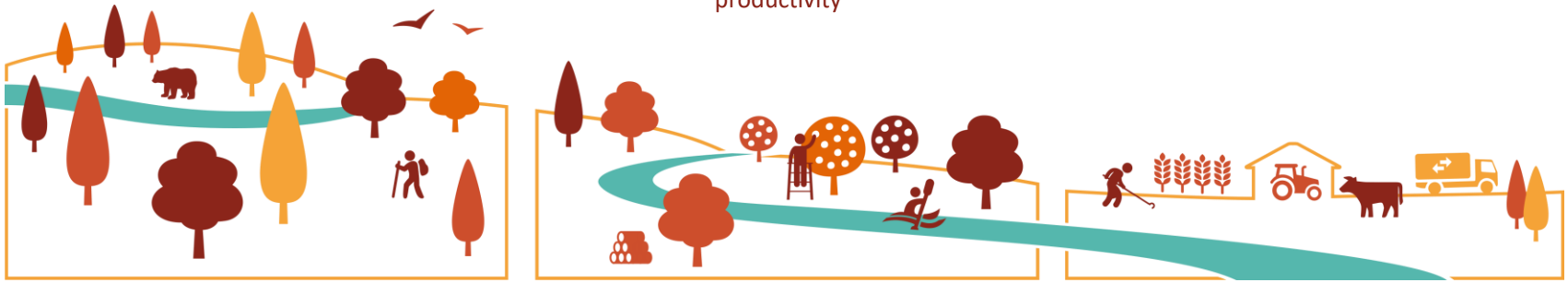
Return of Natural Capital
Restoring biodiversity, soil and water quality.

Return of Financial Capital
Realizing long-term sustainable profit.

NATURAL ZONE
Designed for restoring the ecological foundation and biodiversity

COMBINED ZONE
Designed for restoring the topsoil and delivering sustainable economic productivity

ECONOMIC ZONE
Designed for delivering high and sustainable economic productivity



Source: Commonland, 2016

Need to identify, develop and scale up the most sustainable business models across the value chain

Scope

For each step of the value chain, we need to...

- **Identify** those business models that are sustainable financially and contribute to a net positive vision, but which currently remain "islands of success";
- **Develop** these successes to allow them to be replicated; relying on sound business thinking and striving for a positive business case for everyone involved;
- **Scale** proven business models by convening key stakeholders and through a common language for implementing and measuring sustainable practices (*see next page*)

Examples of initiatives that are heading in the right direction:

IDH SDM: testing effectiveness and improving efficiency of delivery of sustainability- and productivity services

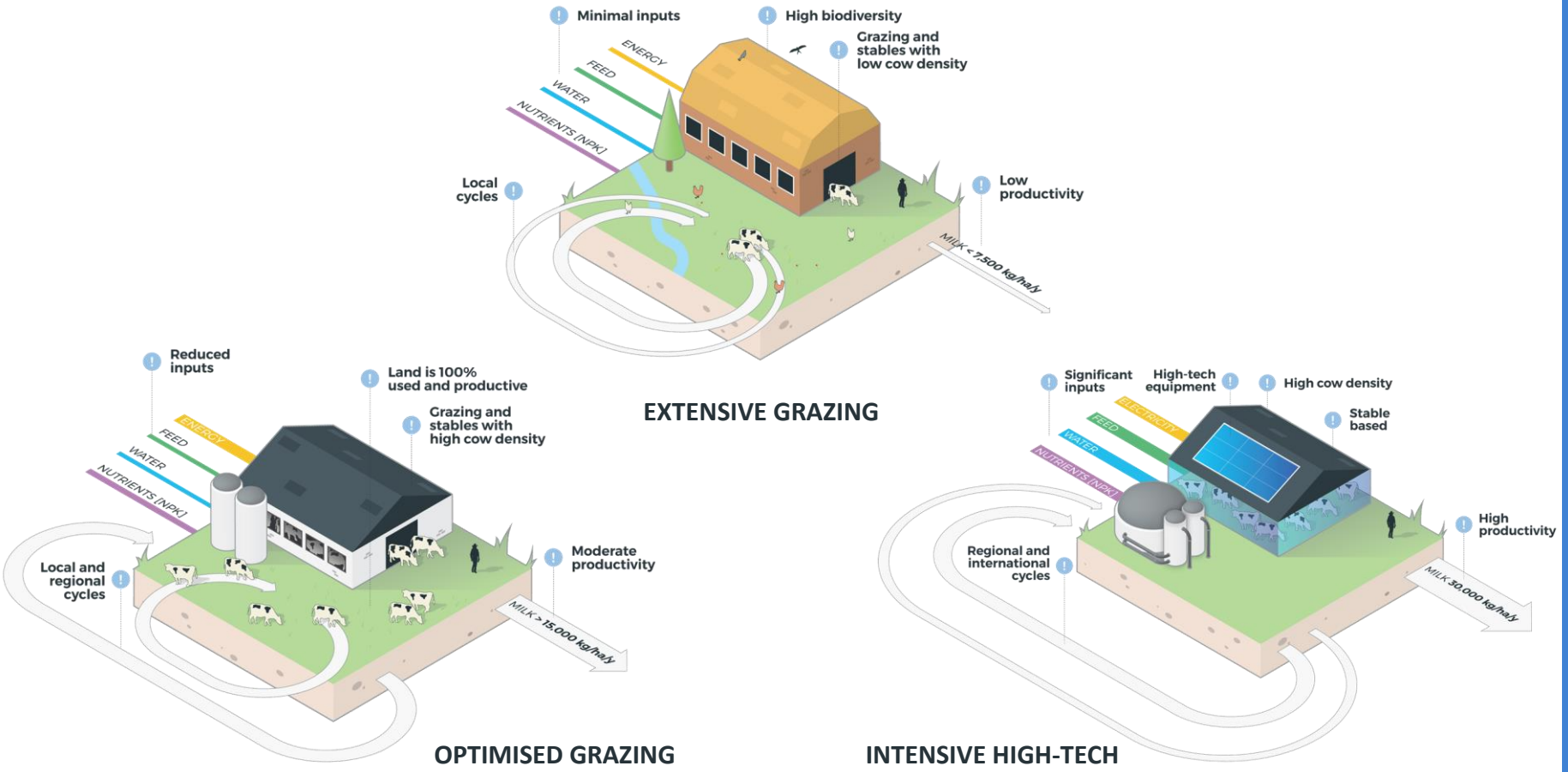
Organic Cotton Accelerator: piloting sourcing interventions to improve business case for textiles value chain

Green Protein Alliance: retailer and consumer goods companies collaborating for a balanced mix of vegetable- and animal proteins

Need diversity of solution pathways

example: pathways for dairy farming in northern Europe

Solutions



Source: Discussion report by Circle Economy, commissioned by FrieslandCampina, World Dairy Summit October 2016

Many existing sustainability tools can be instrumental to drive outcomes but should not be seen as dogmatic goals in itself

Tools

Measurement and analysis tools:
- Life Cycle Analysis (LCA)
- Environmental Profit and Loss (EP&L)

These tools can be used to drive compliance with minimum acceptable performance level and can create a common language for continuous improvement beyond minimum levels

In recent years, many strong initiatives have taken shape, that fit in a holistic transition agenda

examples that may lead to change at scale

Consumer end markets

BLUE HILL AT STONE BARNS

INSTOCK

RECHTSTREEX VAN DE BOER

AMERICAN FOOD 2.0

Agro Value chains

KROM KOMMER

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Green innovation centres for the agriculture and food sector

PARTNERS IN FOOD SOLUTIONS

African Alliance for Improved Food Processing (AAIFP)

SCOPE*insight*

World Cocoa Foundation

CocoaAction

OrganiMark

Agriculture Production Landscapes

SLM

SEKEM

LIVELIHOODS

Act today for a better future

Agros fortis

SAVORY INSTITUTE

FARMLAND LP

Investing in Sustainability™

COMMONLAND

4 RETURNS FROM LANDSCAPE RESTORATION

How to accelerate the transition: call to action to governments, businesses, science and NGOs

- Find or build *coalitions of the committed*
  - Leading governments, representing each of the three archetype areas
  - Leading businesses representing most of the global supply chains
  - Few farmers, companies and other initiatives that represent current state of the art of sustainable food production
  - Funding organizations
  - Science, FAO, World Bank , Endorsing NGOs

- With these coalitions of the committed: Select a specific supply chains, and for each supply chain a few production landscapes + a few end markets to tackle with an holistic approach.

- Together with local stakeholders and front running initiatives: Tailor the described holistic agenda for the selected supply chains, landscapes and consumer end markets, and define roles and accountabilities for each element of the agenda

- Execute the agenda for chosen supply chains, landscapes and end markets; expand coalition of stakeholders

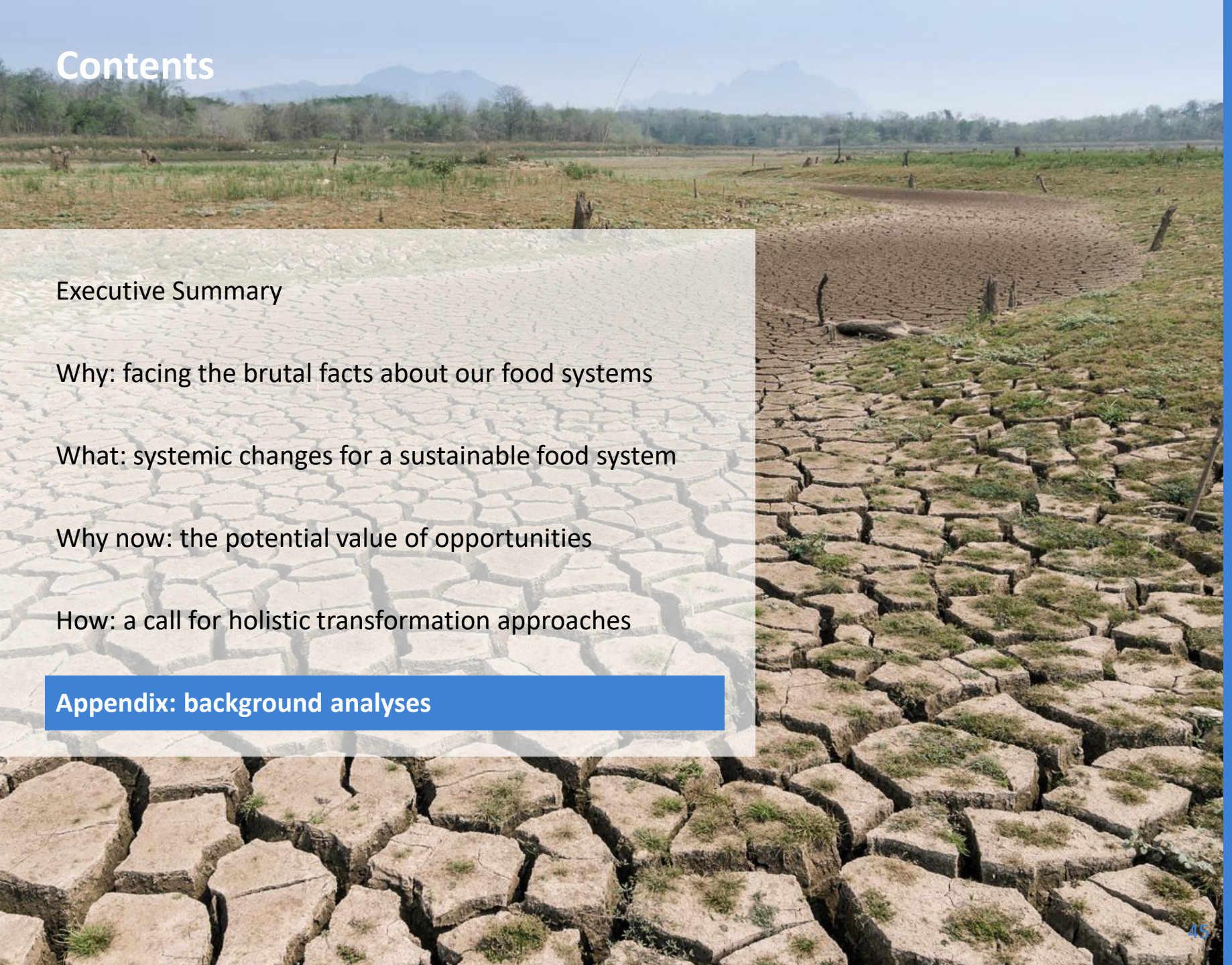
- Develop proofs of concept; learn and scale up

First options to form coalitions with holistic transition agendas

Some suggestions; further development and screening of opportunities clearly needed

Coalition scope	Potential agendas – based on first exploratory analysis
 **The Netherlands**	• Establish restorative agriculture production in Dutch Delta landscape • Establish Net positive local value chains (especially dairy, meat, horticulture) • Promote sustainable and healthy consumer diets • Develop repeatable transition models for export to other areas globally
 **Olive landscapes Spain**	• Establish restorative, multi cropping, production models for Spanish olive tree landscapes • Establish competitive business models for value chains of olives and all other crops that fit a restorative vision for these landscapes
 **Cocoa**	• Expand Cocoa Action approach beyond Cocoa for the relevant landscapes (Ghana, Cote d'Ivoir + tbd). • Develop credible transition paths to end poverty traps, build vibrant rural economies and establish restorative agriculture production methods in these landscapes • Establish competitive business models for all relevant value chains from these landscapes
 **Dairy**	• Define requirements for net positive in all archetype dairy production landscapes, including US, Europe, India, East Africa, New Zealand, South East Asia • Develop credible transition paths for different dairy farming models (e.g. extensive grazing, optimized grazing, mixed farming, intensive high tech, ….) • Adapt cooperative supply chain models to enable transition towards net positive • Adapt Dairy Sustainability Framework (DSF) as tool to support the required transition

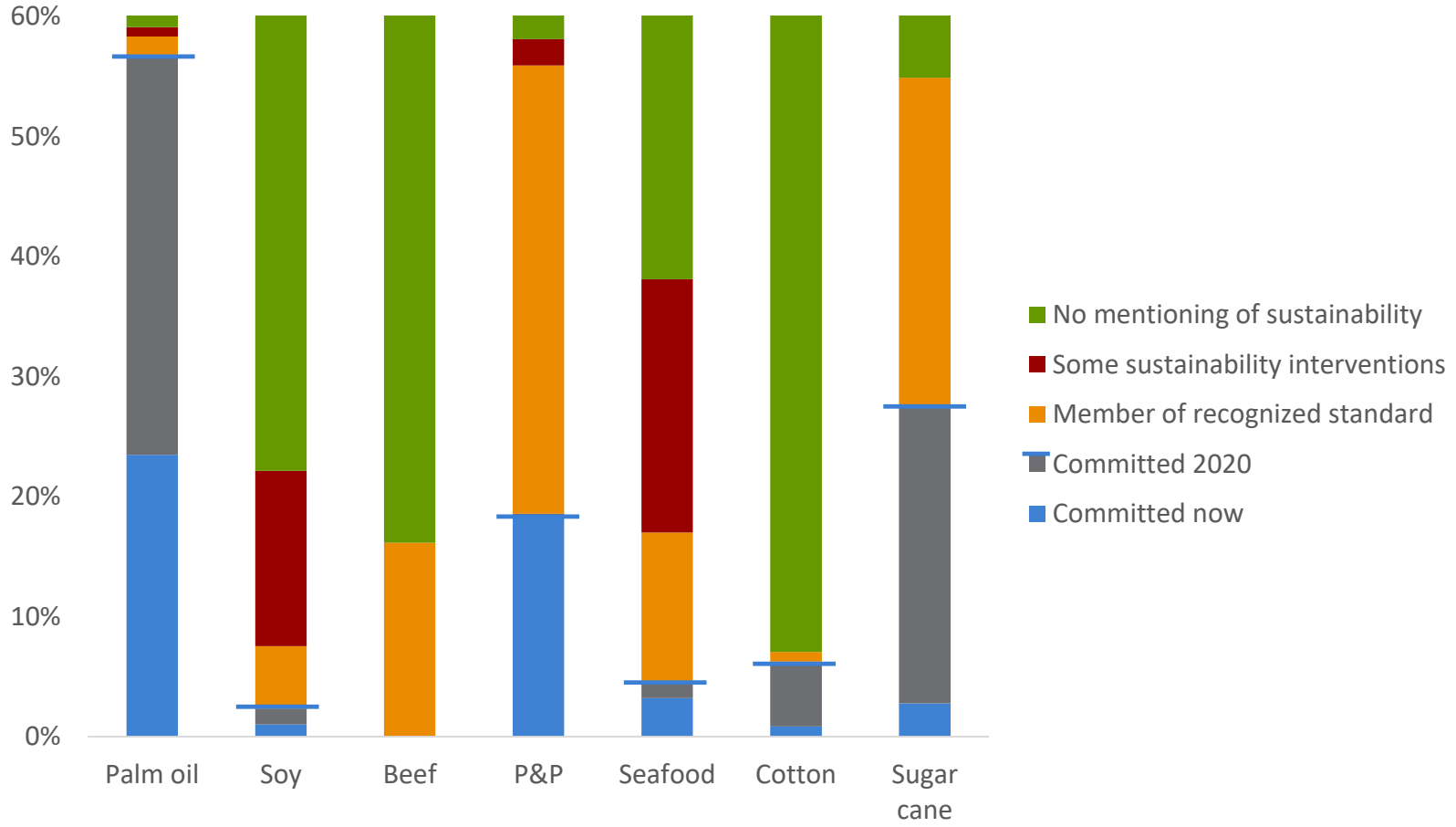
Contents



Progress towards sustainability is slow

example: Certification commitments of consumer goods forum members to commodities prioritized by WWF

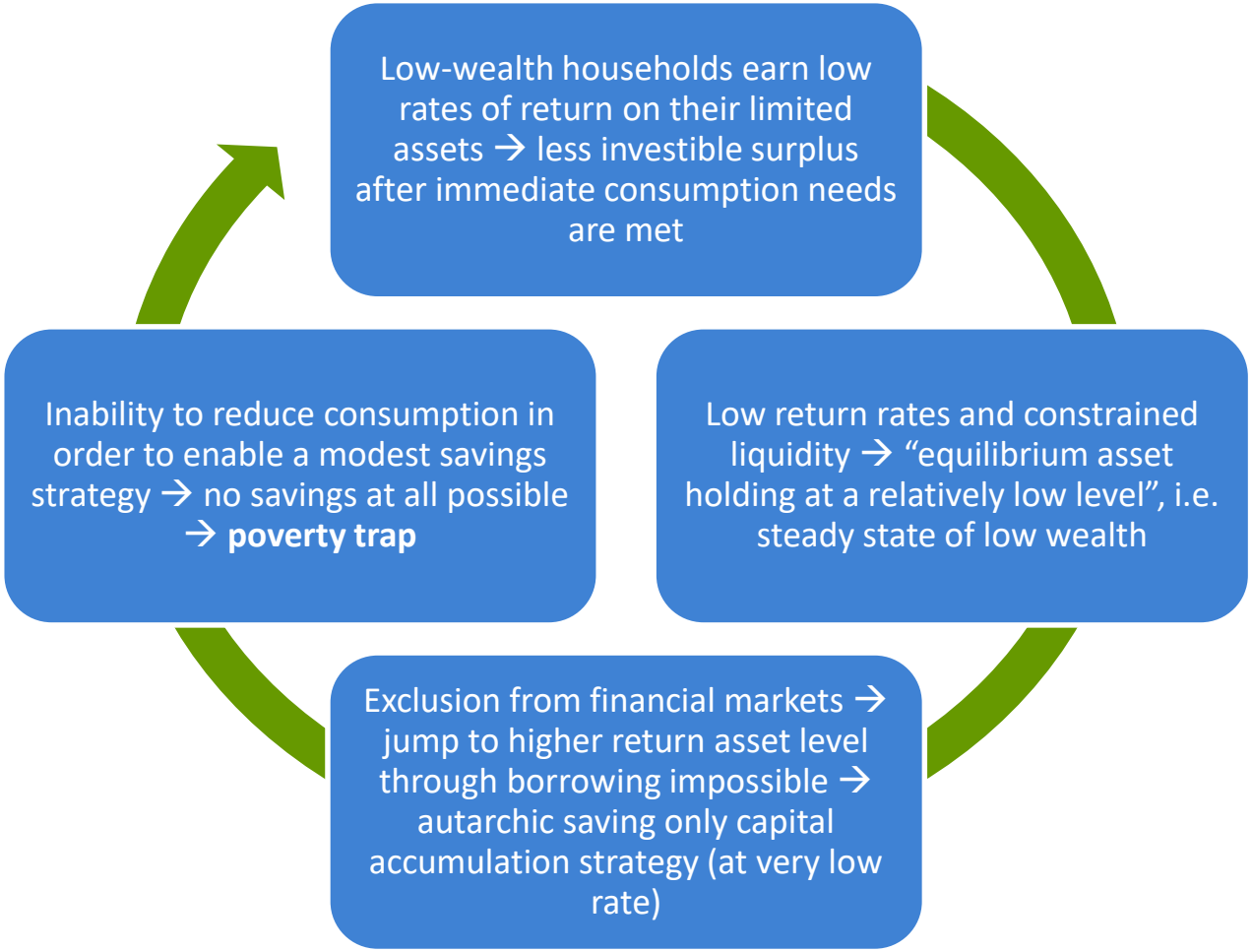
CGF members' sustainability[1] commitments as % of total volumes purchased per commodity



Source: Slow Road to Sustainability (WWF, June 2016)

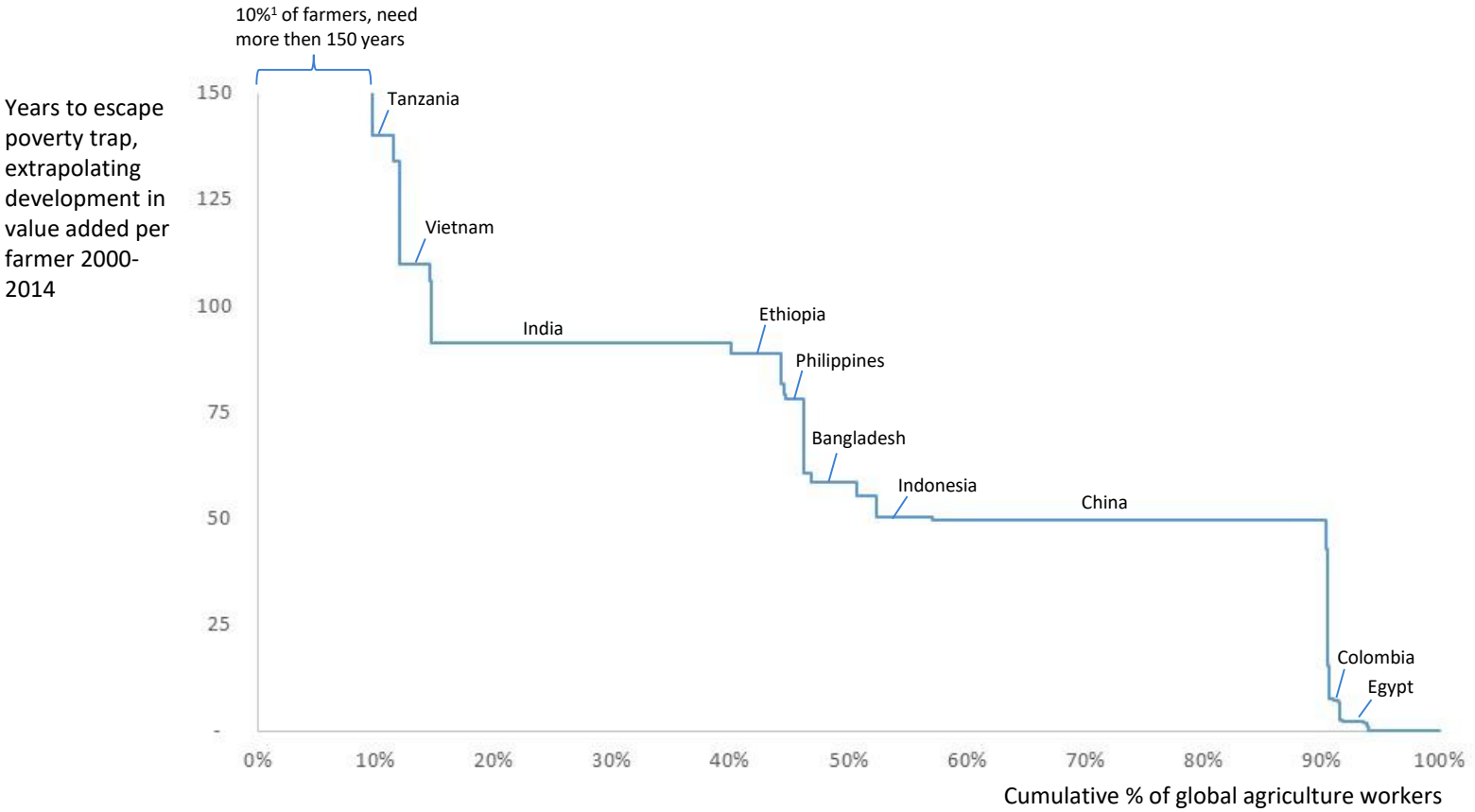
1. Sustainability commitment measured as commitment to buy WWF recognized certified commodities: RSPO for Palm Oil, RTRS or ProTerra for Soy, GRSB for Beef, FSC and recycled for Pulp&Paper, MSC/ASC for Seafood, BCI, Cotton from Africa or Fair trade for Cotton and Bonsucro for Sugar cane. Note that even 100% certification commitment on these commodities would not equal full sustainability for reasons explained later on in this report.

Poor farmers are caught in a poverty trap and cannot invest in improved and more sustainable production



Source: Tittonell, P. and K.E. Giller, 2012. When yield gaps are poverty traps: The paradigm of ecological intensification in African smallholder agriculture. *Field Crops Research* 143 (2013) 76–90; Carter, M.R. and C.B. Barrett, 2006. The economics of poverty traps and persistent poverty: An asset-based approach. *The Journal of Development Studies* 42 (2006) 178-199

Extrapolating speed of last 15 years it will take 50 to 100 years for average farmer to escape the poverty trap



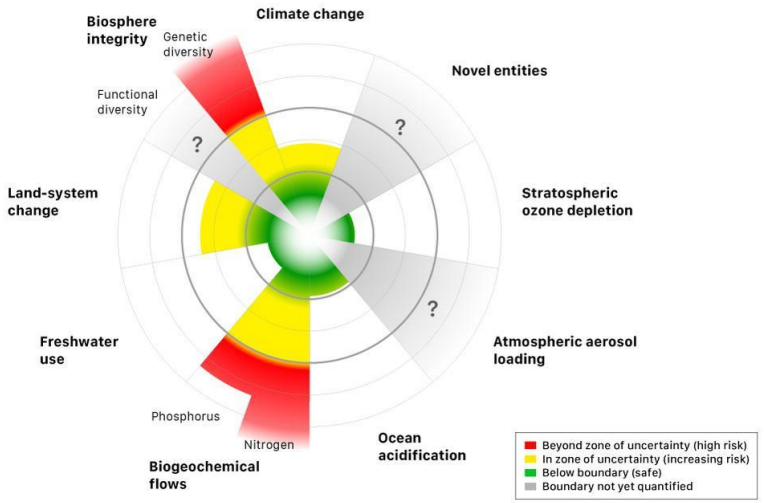
1. Including the farmer populations of Zimbabwe, Zambia, Madagascar, Uganda, Congo, Kenya, Malawi, Sudan, Pakistan, Nepal and Bolivia

Source: NewForesight analysis of World development indicators (World Bank)

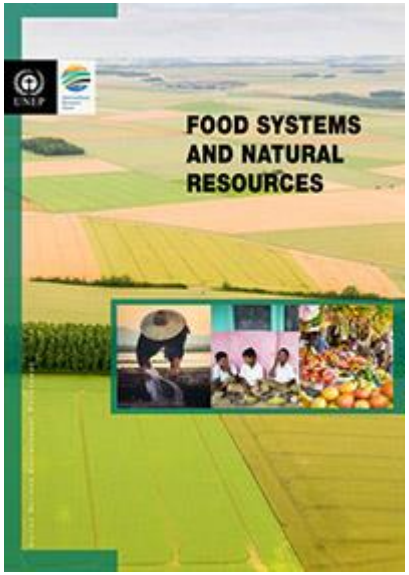
Environmental impact can best be measured through the lens of planetary boundaries

Our analysis builds on findings of scientific community

The Stockholm Resilience Center has pioneered the planetary boundaries methodology, showing which vital earth systems are impacted upon by human activity:



The Netherlands Environmental Assessment Agency (PBL) commissioned by UNEP and the International Resource Panel (IRP) investigated the link between these systems and the global food system, showing how food production contributes to planetary boundaries being exceeded



We measured environmental impact per country along four indicators that link to planetary boundaries

Deforestation/Land system change:

% increase forest area 1990-2013

Freshwater depletion:

Agriculture water usage as % of local renewable freshwater resources

Soil depletion/Land system change:

arable land + forest land increase 1990-2013 as % of arable land in 1990

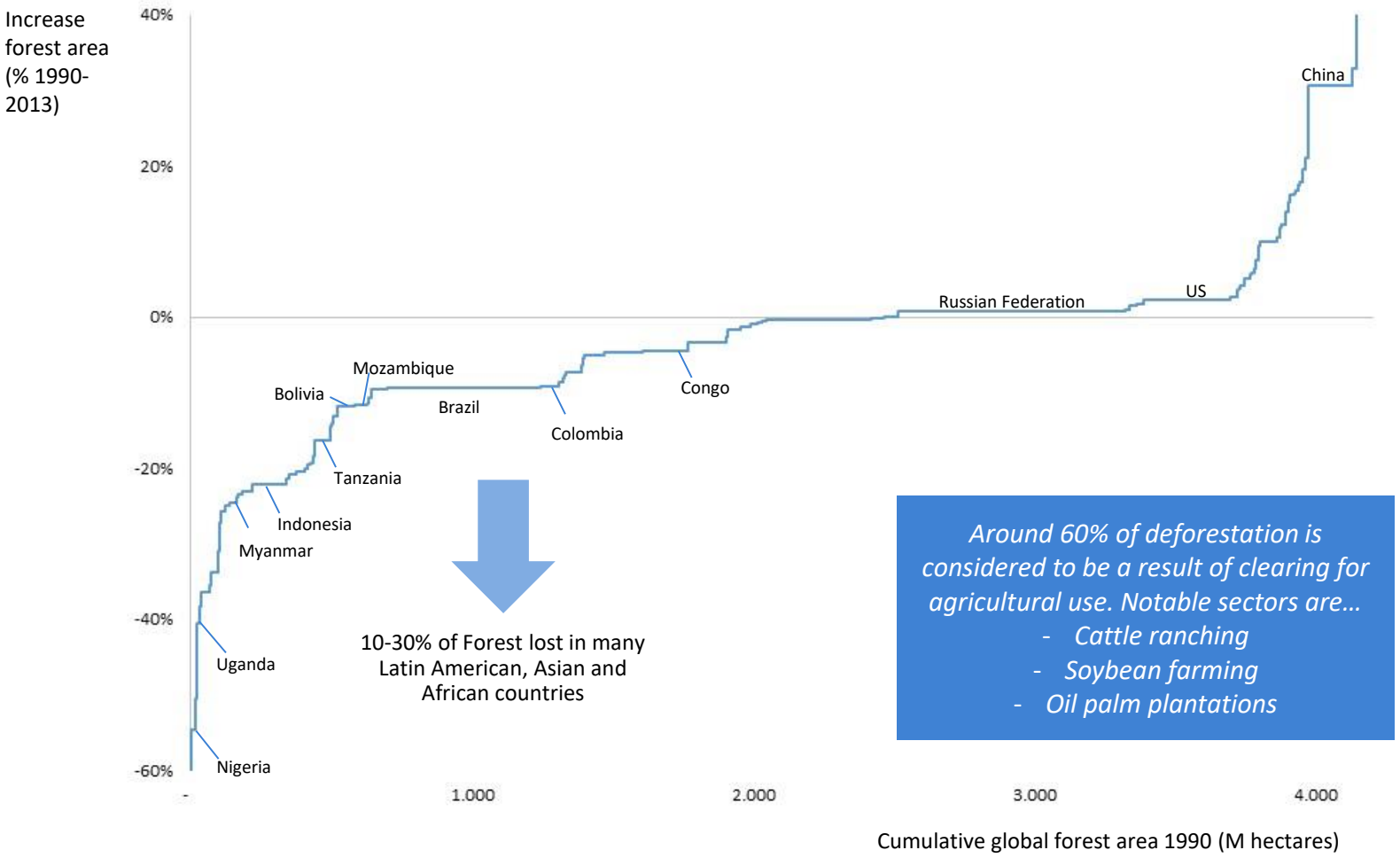
Nutrient overload and GHG emissions:

N_2O emissions from agriculture per hectare agriculture area (KG CO_2 eq.)

1. N_2O emissions used as best available indicator for much broader problem of GHG emissions and nutrient usage as well as correlated problem of nutrient overload and eutrophication

Net loss of 130 M hectares forest area since 1990

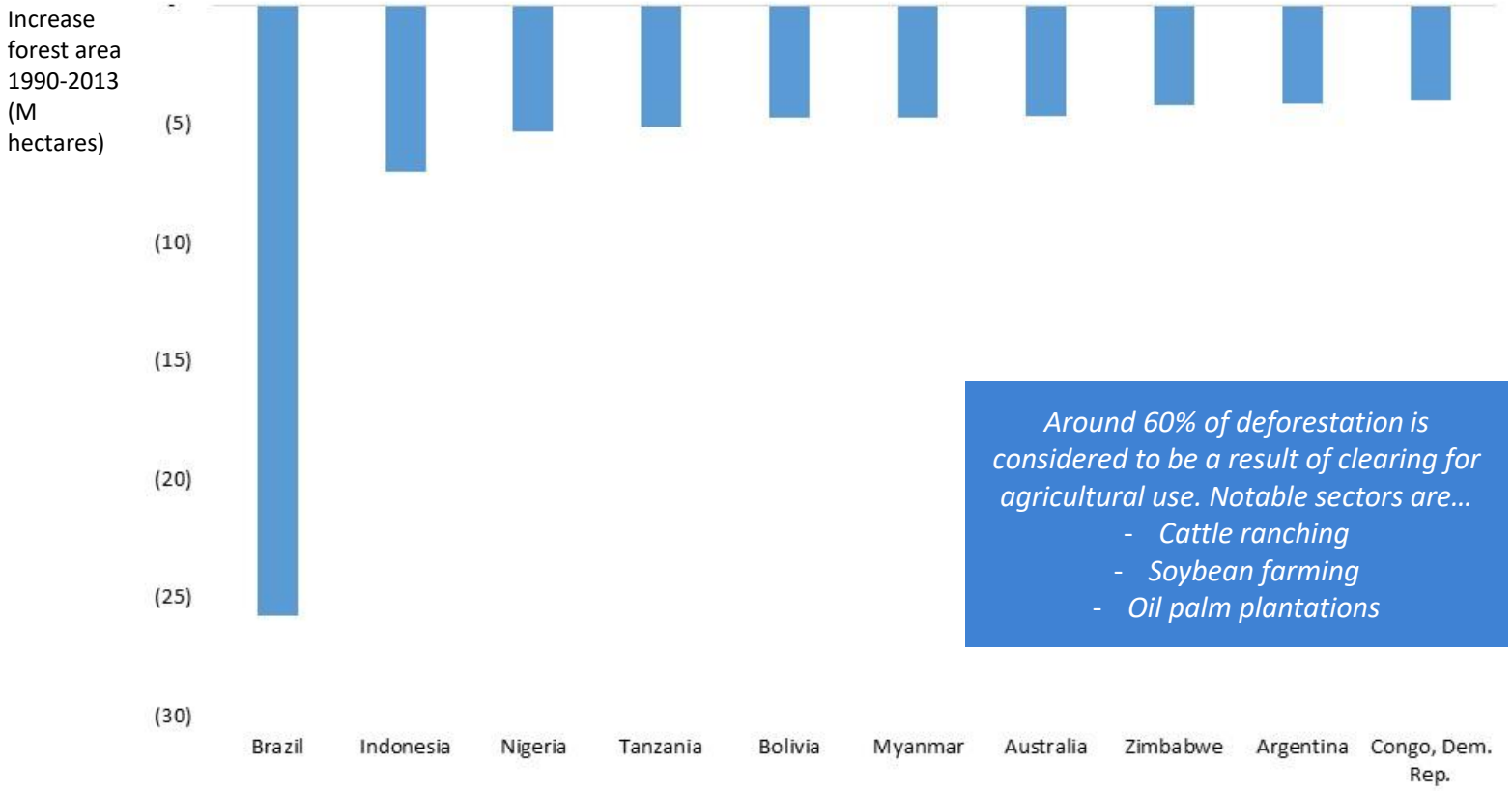
With large differences between countries



Source: NewForesight analysis of World development indicators (World Bank)

Ten countries account for 55% of all deforestation since 1990

Top ten deforestation countries

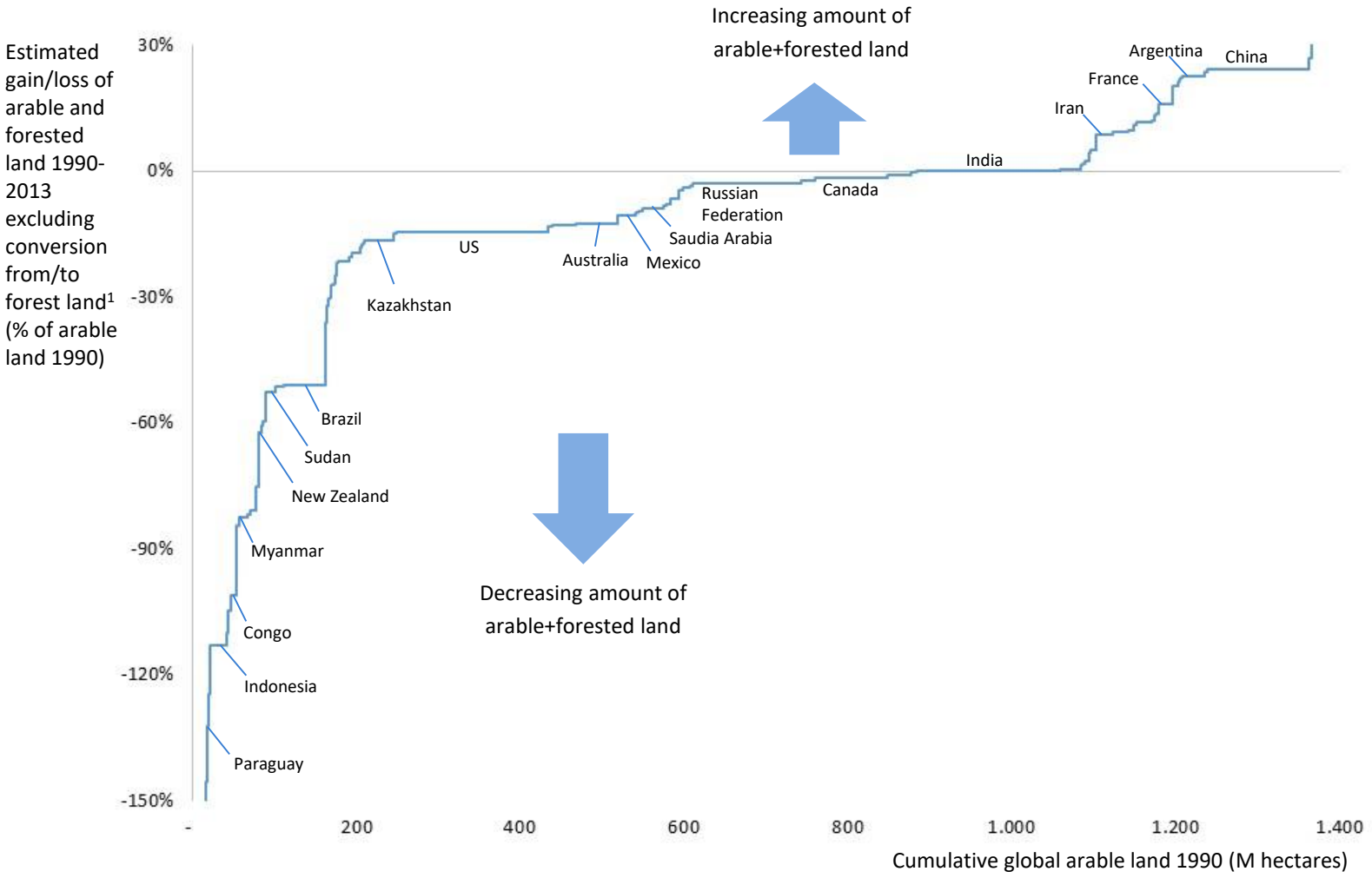


Around 60% of deforestation is considered to be a result of clearing for agricultural use. Notable sectors are…

- *Cattle ranching*
- *Soybean farming*
- *Oil palm plantations*

Source: NewForesight analysis of World development indicators (World Bank)

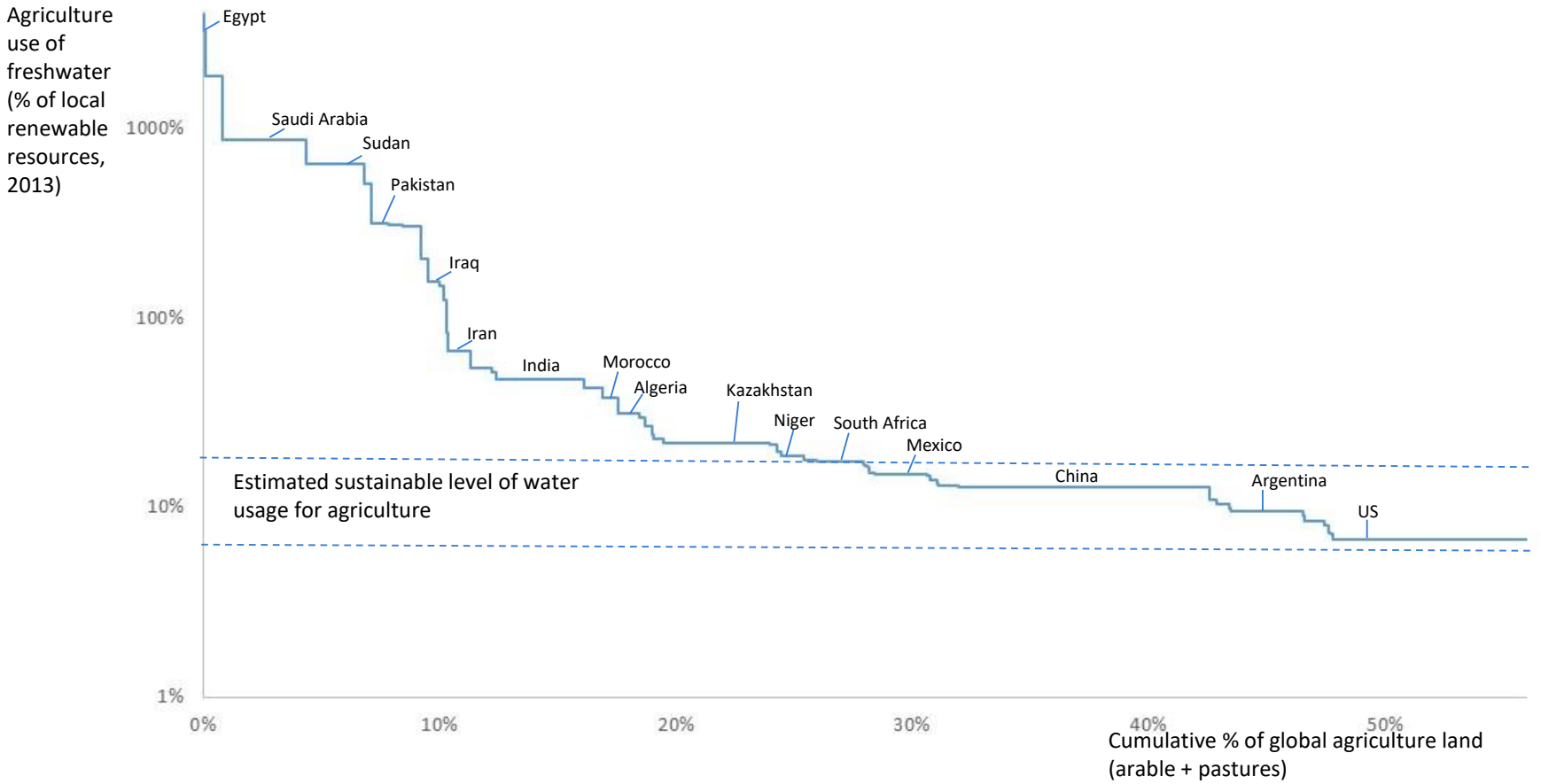
Severe loss of arable land through conversion to pastures, urbanization and degradation in many countries



1) Calculated as (hectares arable and forested land 2013 minus hectares arable and forested land 1990)/hectares arable land 1990

Source: NewForesight analysis of World development indicators (World Bank)

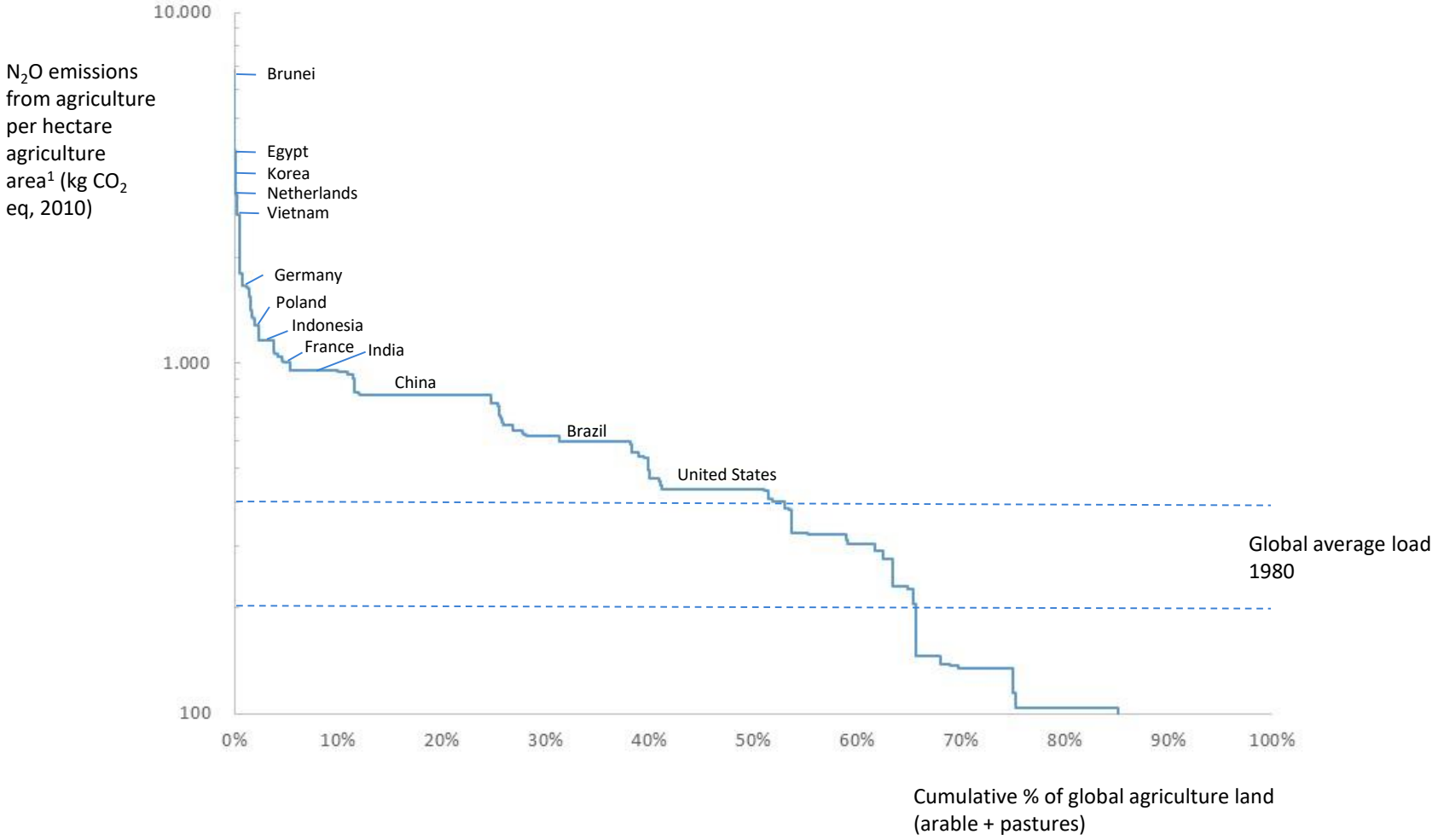
Agriculture important driver of freshwater scarcity on 20%-50% of global agriculture area



All numbers are country averages that may mask huge regional and/or seasonal variability

Source: NewForesight analysis of World development indicators (World Bank)

Agriculture important driver of GHG emissions and high nutrient inputs on >60% of global agriculture area

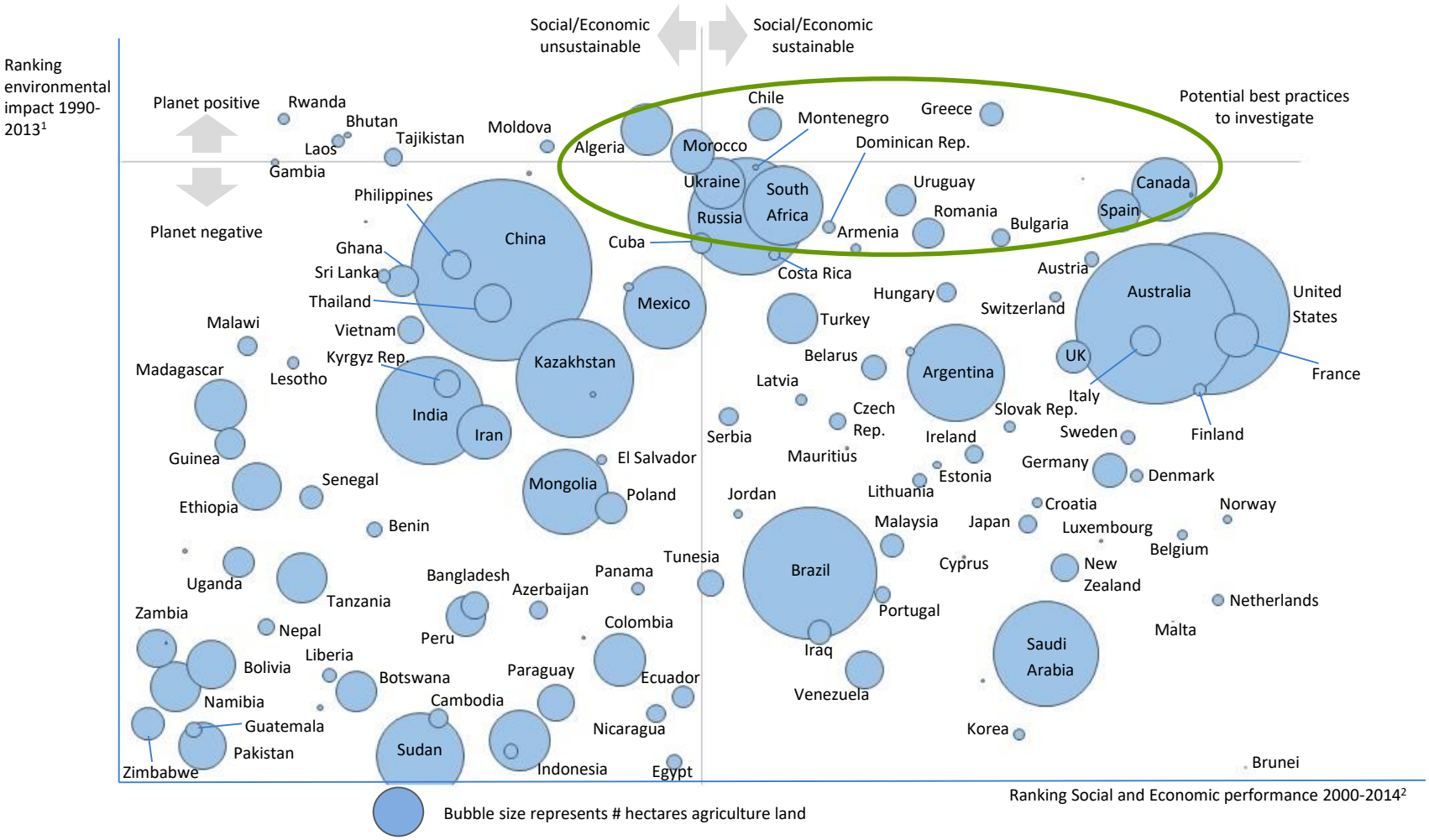


1. N_2O emissions used as preliminary indicator for much broader problem of GHG emissions and nutrient usage as well as correlated problem of nutrient overload and eutrophication

Source: NewForesight analysis of World development indicators (World Bank)

Transformation of agriculture needed almost everywhere

Very few countries with truly sustainable agriculture system



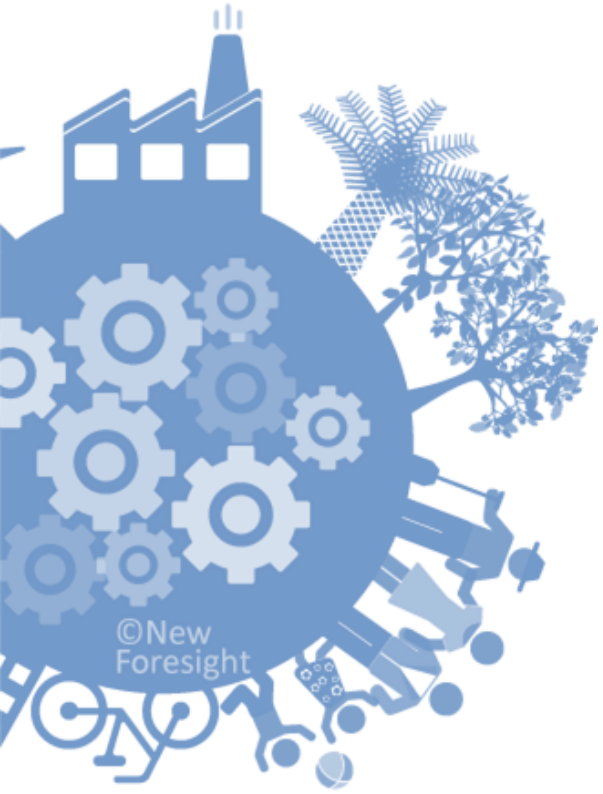
1. 122 countries ranked on environmental impact on five indicators: % increase forest area 1990-2013; % increase fertile soils 1990-2013, water use as % of renewable availability in 2013, N_2O emissions per ha in 2013 (as proxy indicator for nutrient overload and GHG emissions), Threatened species per 1000 sq km in 2013 (as proxy indicator for biodiversity); see backup slides for individual country data
2. Countries where value added per farmer > 5000 US$ per annum ranked on value added per farmer. Poorer countries ranked on years it will take to reach 5000 US$ value added per farmer extrapolating growth rate 2000-2013

Source: NewForesight analysis of World development indicators (World Bank)

About NewForesight

NewForesight Consultancy (est 2008) is a strategy consulting firm specialized in solving complex sustainability challenges and turning them into opportunities for all.

NewForesight
driving sustainable market transformation



We think about future-proof agriculture holistically, grounded in our extensive experience in transforming agro-commodity markets.

We've worked with more than 25 industry platforms and NGOs, over a dozen government- and multilateral agencies, as well as front-running companies in all major agro-commodity sectors.

The wealth of experience and insights from our diverse team, combined with frameworks and models which we have validated and perfected using real world application, allow us to shape systems that incentivize sustainable behavior.

About Commonland

Commonland believes that landscape restoration offers large untapped opportunities for sustainable economic development. To demonstrate this potential, the company develops landscape restoration projects that are based on business cases.

COMMONLAND
4 RETURNS FROM LANDSCAPE RESTORATION

Multidisciplinary teams actively involve investors, companies and entrepreneurs in long-term restoration partnerships with farmers and land-users.

Commonland's restoration approach combines and connects natural and economic landscape zones. This holistic approach delivers 4 returns:

Return of inspiration – giving people hope and a sense of purpose;

Return of social capital – bringing back jobs, business activity, education and security;

Return of natural capital – restoring biodiversity, soil and water quality;

Return of financial capital – realizing long-term sustainable profit.

About The Boston Consulting Group

The Boston Consulting Group (BCG) is a global management consulting firm and the world's leading advisor on business strategy. We partner with clients from the private, public, and not-for-profit sectors in all regions to identify their highest-value opportunities, address their most critical challenges, and transform their enterprises. Our customized approach combines deep insight into the dynamics of companies and markets with close collaboration at all levels of the client organization. This ensures that our clients achieve sustainable competitive advantage, build more capable organizations, and secure lasting results. Founded in 1963, BCG is a private company with 85 offices in 48 countries.