Global Land Programme, status and updates for the LCLUC community

Unlocking the potential of land systems (**and science!)** to contribute to SD and the Agenda 2030

2018 NASA LCLUC Spring Science Team Meeting
Gaithersburg, MD USA 4.3..2018

Ariane de Bremond
Executive Officer

futureearth
research for global sustainability

Global LAND Programme

UNIVERSITÄT BERN
CDE CENTRE FOR DEVELOPMENT AND ENVIRONMENT

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Roadmap

- **Global Land Programme** (activities, research agenda)
- **Recent work/emerging themes/outlook/activities**
- **Land and Agenda 2030 - how can we put land on the global agenda?**

GLP: How did we get here?

→2015 GLP becomes a ”Global Research Project’ (GRP) of

GLPs’ first 10 years: joint project of IHDP and IGBP

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Global Research Projects (GRPs)
(GLP, GBMA, ESG, PAGES, IGAC, AIMES iLeaps, PECS, BioDISOVERY, and others

KANS
NEXUS
SDGs
Decarbonisation
Transformations
Sustainable finance

Global LAND Programme
GLP.earth

GLP SSC
(Scientific Steering Committee)
Agenda Setting
Governance

LSS research & synthesis

Our Scientists
Nodal Offices
GLP Community
Contributing Projects
Working Groups

UN processes

GSDR Report:
Land chapter (July '19)

United Nations Convention to Combat Desertification
UNCCD
Global Land Outlook

completed 2003

Global Change and Terrestrial Ecosystems → GCTE sponsored by IGBP

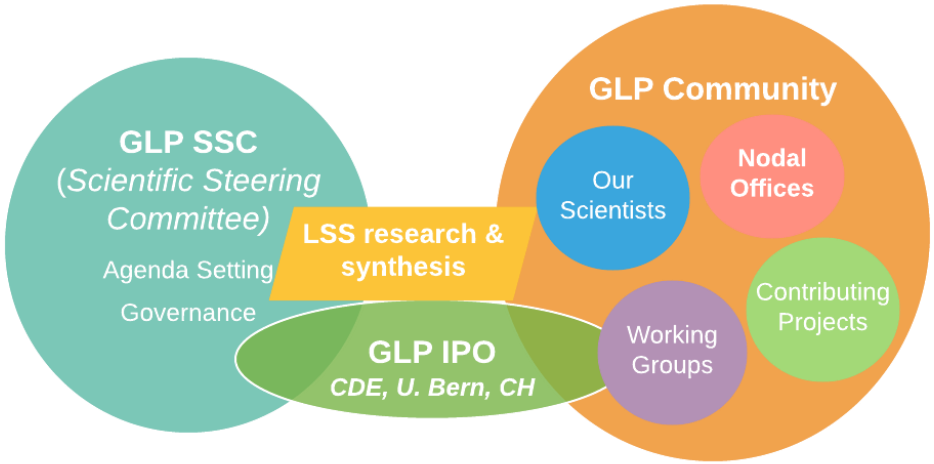
Land-Use / Cover Change → LUCC co-sponsored by IGBP/IHDP

GLP
co-sponsored by IGBP/IHDP

coupled human-environment terrestrial system (Land System)

completed 2005

Global LAND Programme



Connecting People, Land & Solutions

Global research on **land systems** and **land change**

Coordinating, inspiring, networking, enabling, summarizing & supporting

- **Scientific Steering Committee** (SSC)
- **International Project Office** (IPO; CDE, Bern, Switzerland)
- **Nodal Offices** (Taiwan, Japan, China, Germany, Cypress, Cote d'Ivoire, Argentina, North America)
- **New mid-2017: Working Groups, Contributing Projects**
- **Open Science Meetings** (next: Bern, Switzerland April 24-26 2019)

Current status

futureearth
research for global sustainability

Global Resarch Projects (GRPs)

(GLP, GBMA, ESG, PAGES, IGAC, AIMES iLeaps, PECS, BioDISOVERY, and others

KANS

NEXUS
SDGs
Decarbonisation
Transformations
Sustainable finance

New developments:
'reset' for FE

Global LAND Programme
GLP.earth

GLP SSC
(Scientific Steering Committee)

Agenda Setting

Governance

LSS research & synthesis

Our Scientists

Nodal Offices

GLP Community

Contributing Projects

Working Groups

GLP International Programme Office CDE/U. Bern

Executive functions (governance and coordination); synthesis research/Special Issues

Workshops/synthesis activities: working groups/nodals

Open **S**cience **M**eetings (2-4 years) (April 2019)

Future Earth: as GRPs/ with KANS/ National Committees

Policy Impact: Bridging land systems science to policy

INTERNATIONAL LAND COALITION
ILC

UN processes

GSDR Report:
Land chapter (July '19)

United Nations Convention to Combat Desertification

UNCCD Global Land Outlook
2017 (and 2.0 in planning)

IPBES: IGSP Platform on Biodiversity and Ecosystem Services (IPBES)

IPCC AR6

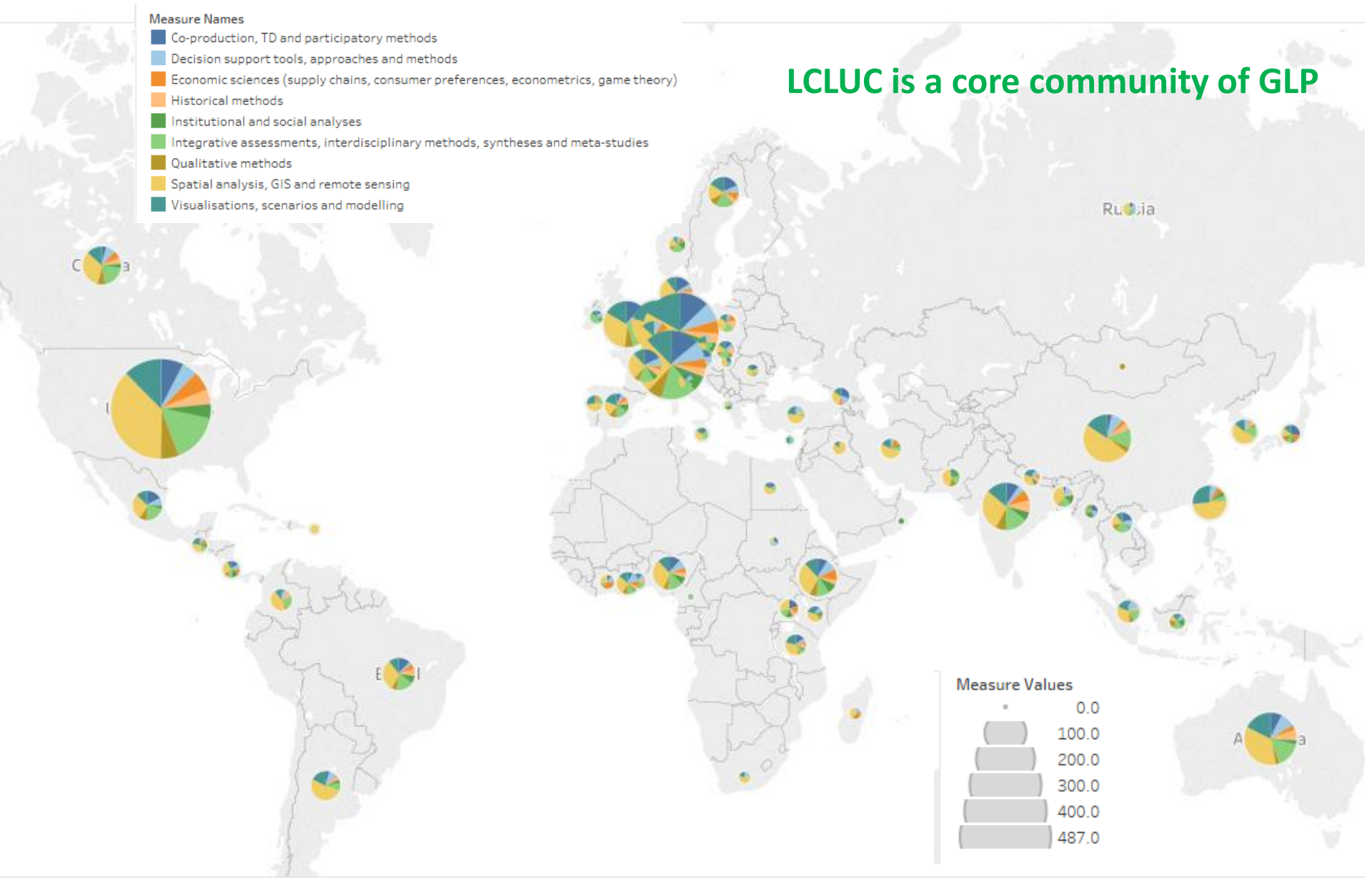
BONN CHALLENGE

160 mha committed to restoration 21. billion in private finance;

Initiatve 20x20 WRI

African Forest Landscape Restoration Initiative

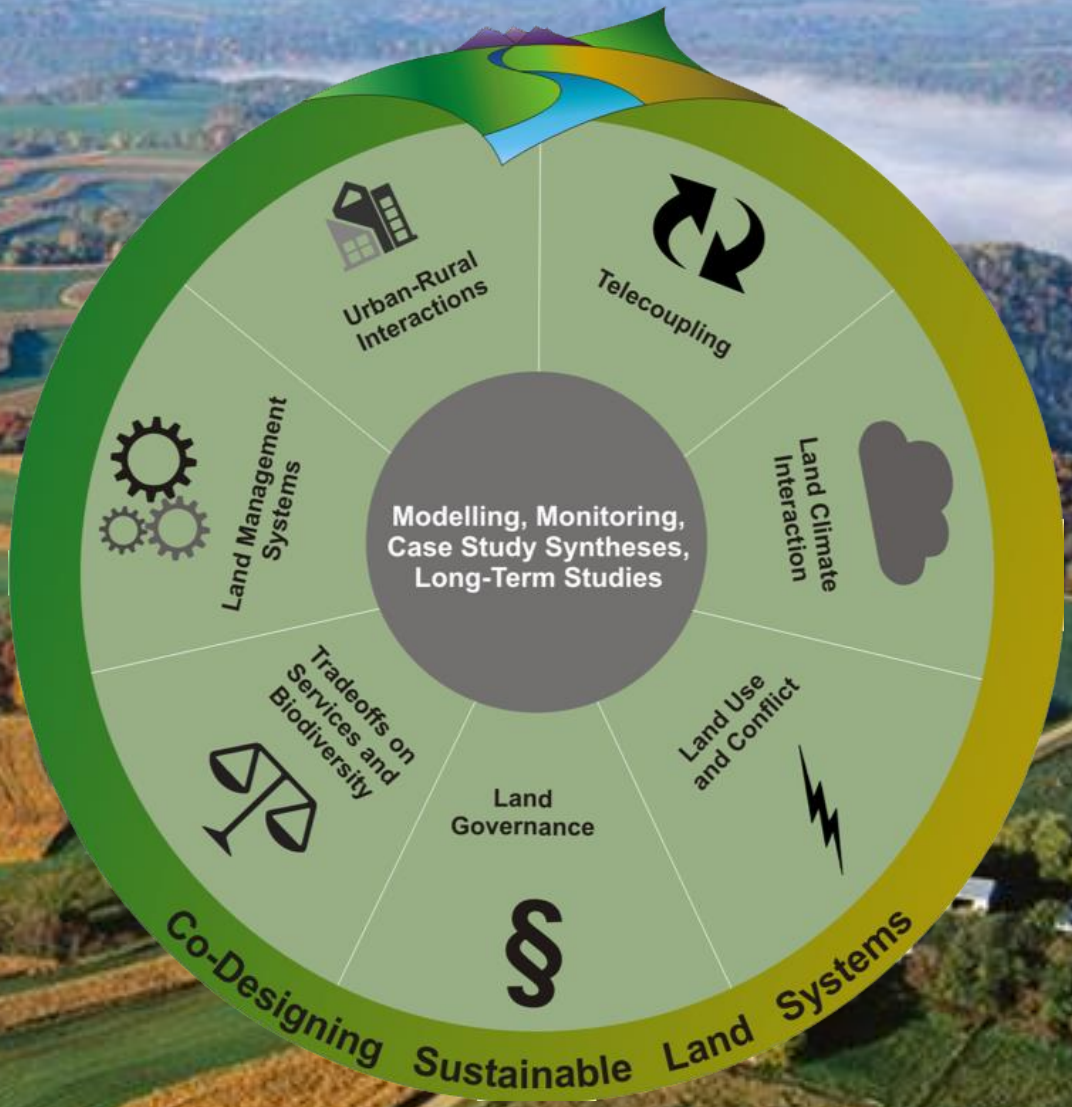
afr100



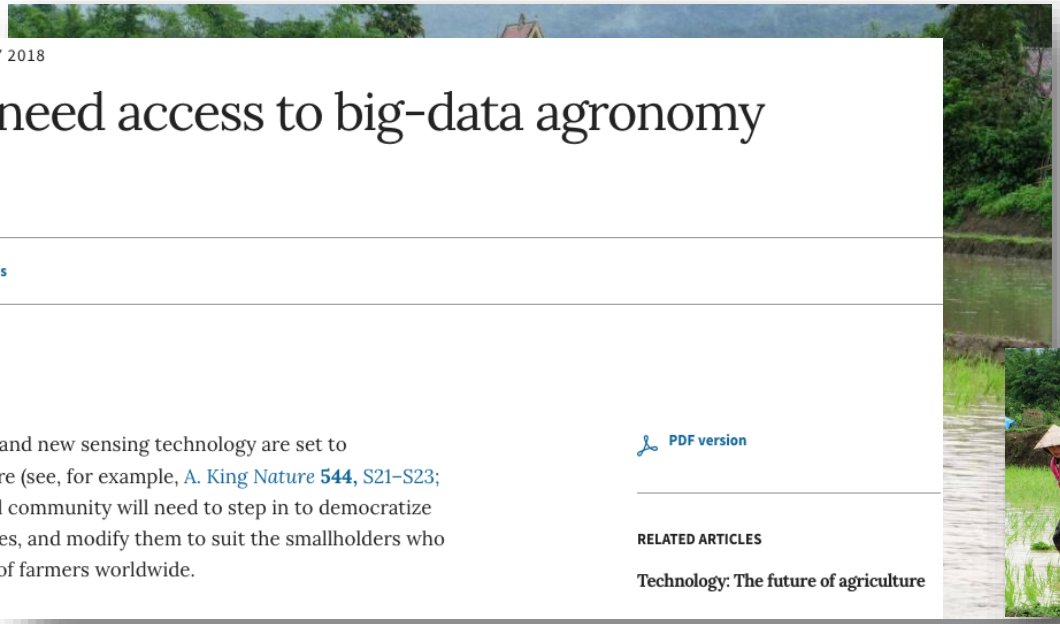
Spatial analysis and RS in the GLP science community

From: 'find a scientist' glp.earth

GLP: new science themes and priorities (2016-2021)




Beyond human impacts
Land Systems
Social-Ecological Systems
Why does land change?
What are the consequences?
Observing | Understanding | Modelling | Collaborating
Land Use & Land Cover
Structure | Function
Multifunctional Landscapes
Management | Decisions
Stakeholders | Governance
Institutions | Markets | Telecoupling
Global
LAND
Programme
GLP.earth
http://e360.yale.edu/slideshow/as_roads_spread_in_rainforests_environmental_toll_grows/52/1/



CORRESPONDENCE · 28 FEBRUARY 2018

Smallholders need access to big-data agronomy too

Zia Mehrabi, Daniel Jimenez & Andy Jarvis

Big data, field robotics and new sensing technology are set to revolutionize agriculture (see, for example, A. King *Nature* **544**, S21–S23; 2017). The international community will need to step in to democratize access to these advances, and modify them to suit the smallholders who comprise the majority of farmers worldwide.

PDF version

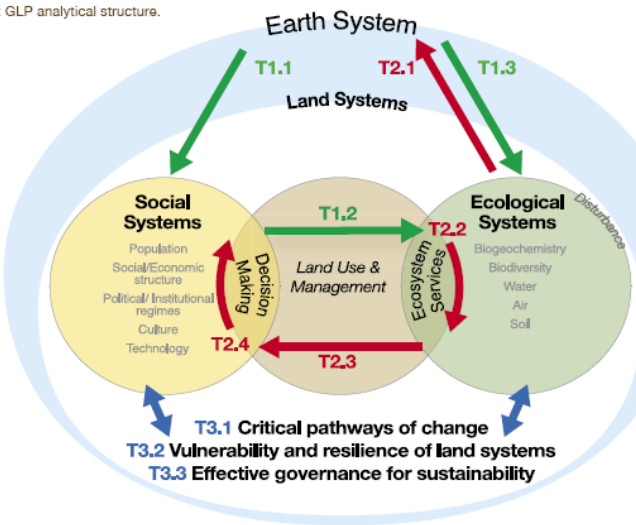
RELATED ARTICLES

Technology: The future of agriculture

Global LAND Programme

Systemic perspectives

Figure 4: GLP analytical structure.



Normative perspective

4. Reflecting on own position towards SD

3. Engaging in co-design of sustainable land systems

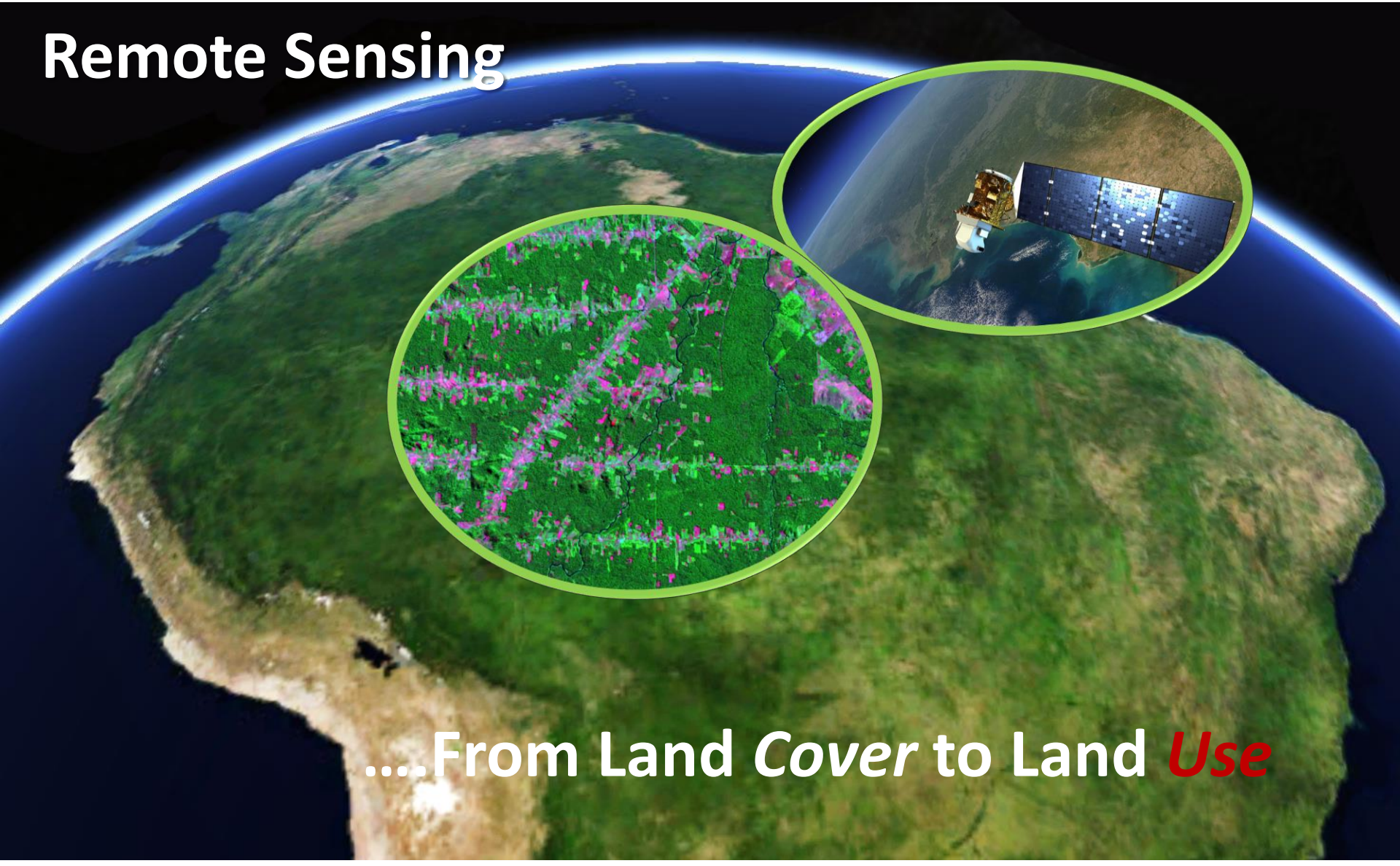
2. Assessing land system outcomes in terms of sustainability goals

1. Assessing different stakeholders' goals with regard to sustainability of land systems

Roadmap

- Global Land Programme (activities, research agenda)
- **Recent work/emerging themes/Outlook**
- Land and Agenda 2030
  - Evolution of SD, transformations, from what to how, role of land systems

Observing Global Land *Cover* Change



….From Land *Cover* to Land *Use*

Measuring land use, land management and land use intensity

Global Change Biology

Research Review

Land management: data availability and process understanding for global change studies

Karl-Heinz Erb, Sebastiaan Luyssaert, Patrick Meyfroidt, Julia Pongratz, Axel Don, Silvia Kloster, Tobias Kuemmerle, Tamara Fetzel, Richard Fuchs, Martin Herold, Helmut Haberl, ... See all authors

First published: 22 July 2016 | https://doi.org/10.1111/gcb.13443 | Cited by:13

linking RS / land-cover analysis with key knowledge gaps

Global Change Biology

RESEARCH REVIEW

Models meet data: Challenges and opportunities in implementing land management in Earth system models

Julia Pongratz, Han Dolman, Axel Don, Karl-Heinz Erb, Richard Fuchs, Martin Herold, Chris Jones, Tobias Kuemmerle, Sebastiaan Luyssaert, Patrick Meyfroidt, Kim Naudts

First published: 13 December 2017 | https://doi.org/10.1111/gcb.13988

Essential for understanding

- Pasture/livestock systems
- Urban-rural dynamics
- and much more..

Sponsored workshop by GMBA, GLP, and BioDISCOVERY looks at future of remote sensing for biodiversity monitoring

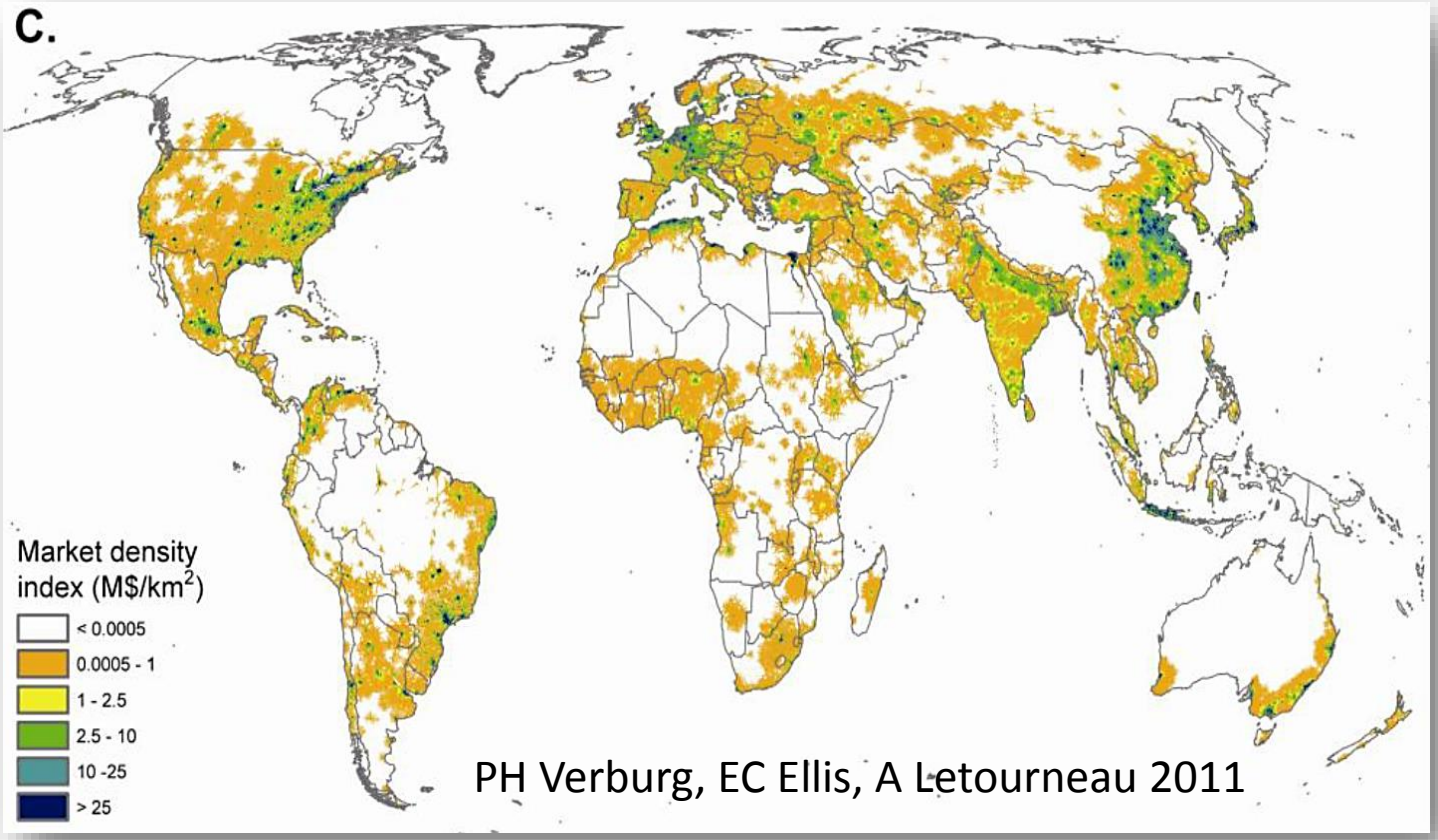
GLP NEWS

Sponsored workshop by GMBA, GLP, and BioDISCOVERY looks at future of remote sensing for biodiversity monitoring

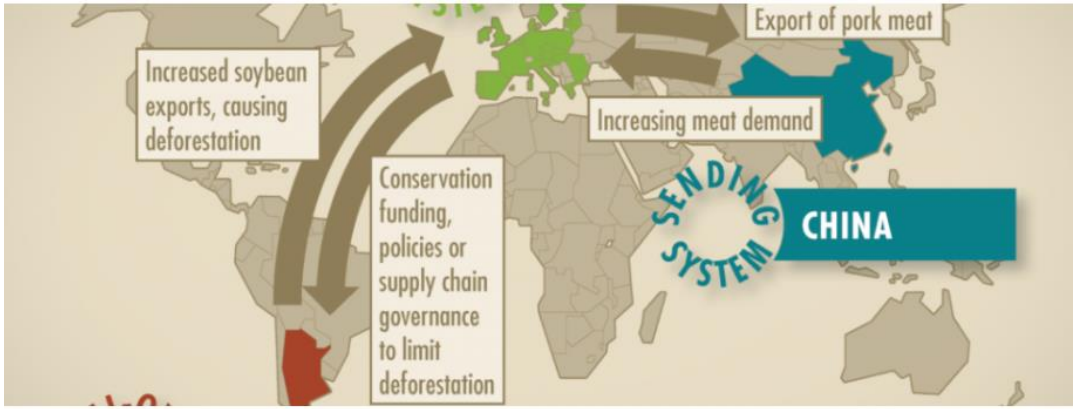
On February 05-07, 2018, the Swiss Future Earth Global Research Projects GMBA, GLP, and bioDISCOVERY and the ESA sponsored GlobDiversity projected brought together 40 international experts to discuss the present and future of remote sensing in biodiversity monitoring and species distribution models. After an afternoon of very well attended guest lectures, participants spent 2 days discussing how remote sensing can and could inform species distribution models, and exploring data from different mountain systems around the world. This event, which was an activity of the GMBA working group on species distribution models and remote sensing , was hosted

Drivers of Global Land *System* Change

Market Influences on Land Use



To telecoupled land change..

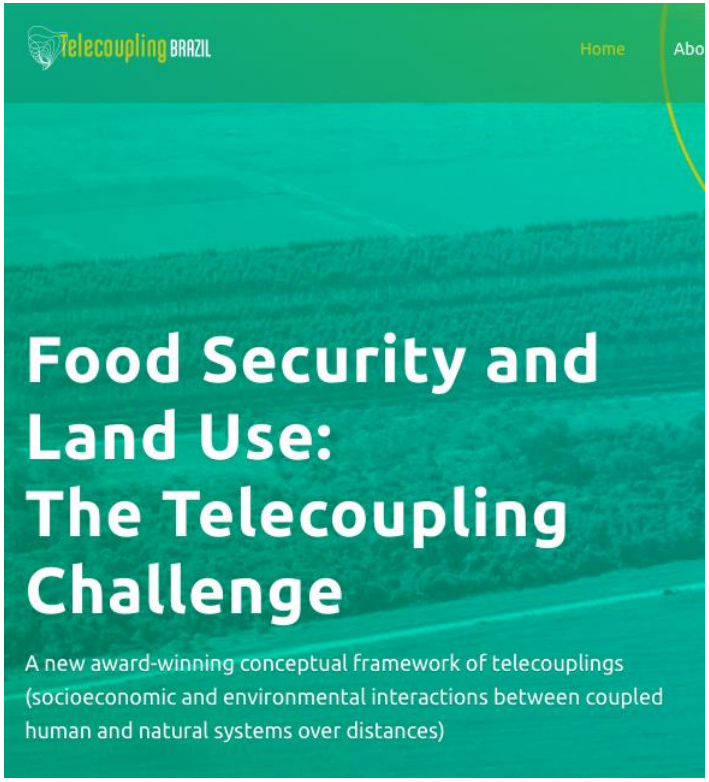


Example of a telecoupling

COUPLED. Operationalising Telecouplings for Solving Sustainability Challenges for Land Use

Photo: A. de Bremond, Republic of Congo

The Global Land Rush: A Socio-Environmental Synthesis



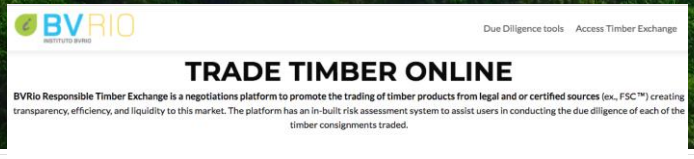
Chinese banana plantations in northern Laos

Managing Telecoupled Landscapes for the Sustainable Provision of Ecosystem Services and Poverty Alleviation

Project time period:
January, 2015 to December, 2020

….From Land *Cover* to Land *Use*

Mapping of supply chains



Soybean field in northern Mozambique

MIDLAND - Developing middle-range theories linking land use displacement, intensification and transitions

Project time period:
May, 2016 to April, 2021

The Project is funded as a European Research Council (ERC) Starting Grant under Grant Agreement N°677140:
http://cordis.europa.eu/project/rcn/203217_en.html

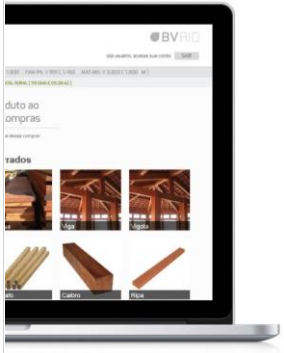
Land is a nexus for crucial societal and environmental challenges including food security, access to water, land degradation, biodiversity loss, and climate change. Development of solutions to balance these tradeoffs and synergies is currently hindered by the lack of theories explaining the conditions under which different pathways of land change occur and lead to different outcomes, integrating human and environmental aspects.

This project develops and tests integrated middle-range theories explaining the linkages between three of the major processes in land systems, i.e., (i) land use intensification and expansion, (ii) land use displacement and trade, and (iii) land use transitions or regime shifts.

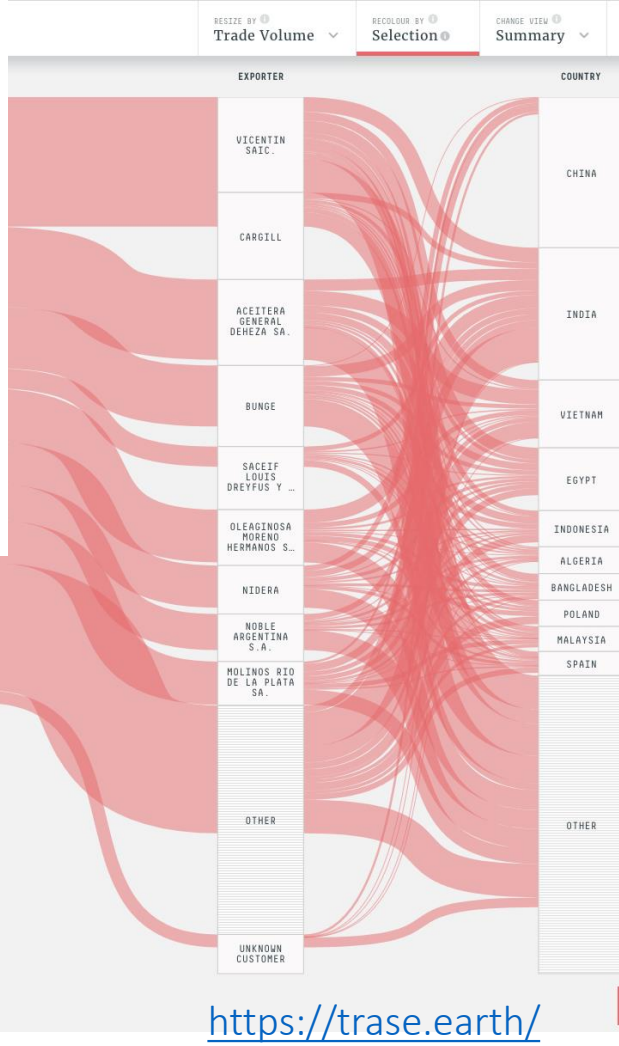
The work focuses on the **emerging agricultural frontier of Southern African dry forests and savannas**, which is a threatened and understudied region, and its linkages with distant places.

We analyze: (i) The strategic field of actors' coalitions, institutions and distant linkages in emerging frontiers; (ii) Links between land use displacement, leakage, and local land changes; (iii) Pathways of agricultural expansion and intensification in tropical landscapes; and (iv) The conditions for transformative governance of land systems to foster resilient landscapes that sustain ecosystem services and livelihoods.

https://glp.earth



/www.bvrio.org/



https://trase.earth/

Understanding dynamics of intensification (as opposed to extensification) & ‘sustainable intensification’

RESEARCH LETTER

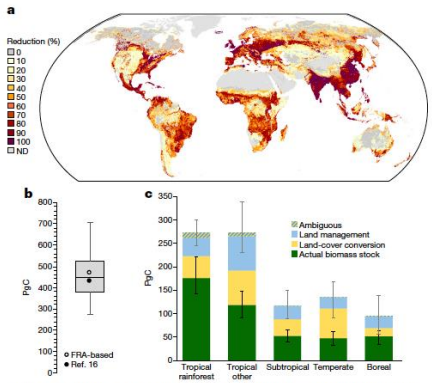


Figure 1 | Differences in biomass stocks of potential and actual vegetation induced by land use. a, Spatial pattern of land-use-induced biomass stock

LETTER

doi:10.1038/nature25138

Unexpectedly large impact of forest management and grazing on global vegetation biomass

Karl-Heinz Erb[1], Thomas Kastner[1,2]*, Christoph Plutzar[1,3]*, Anna Liza S. Bais[1], Nuno Carvalhais[4,5], Tamara Fetzel[1], Simone Gingrich[1], Helmut Haberl[1], Christian Lauk[1], Maria Niedertscheider[1], Julia Pongratz[6], Martin Thurner[7,8] & Sebastiaan Luyssaert[9]

nature sustainability

Altmetric: 57 More detail »

Brief Communication

Trade and the equitability of global food nutrient distribution

Stephen A. Wood, Matthew R. Smith, Jessica Fanzo, Roseline Remans & Ruth S. DeFries

Nature Sustainability **1**, 34–37 (2018)
doi:10.1038/s41893-017-0008-6
Download Citation

Received: 10 August 2017
Accepted: 29 November 2017
Published online: 08 January 2018

ELSEVIER

World Development
Volume 98, October 2017, Pages 523-535

Development Review

Land Sparing and Land Sharing Policies in Developing Countries – Drivers and Linkages to Scientific Debates

Ole Mertz, Charlotte Filt Mertens

Show more

https://doi.org/10.1016/j.worlddev.2017.05.002

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Case Studies of Land System Change

The Gold Standard for Causal Understanding

Global Environmental Change

Volume 50, May 2018, Pages 1-14

Closing global knowledge gaps: Producing generalized knowledge from case studies of social-ecological systems

Nicholas R. Magliocca [a], Erle C. Ellis [b], Ginger R.H. Allington [c], Ariane de Bremond [d, e], Jampel Dell'Angelo [f], Ole Mertz [g], Peter Messerli [e], Patrick Meyfroidt [h, i], Ralf Seppelt [j, k, l], Peter H. Verburg [m]

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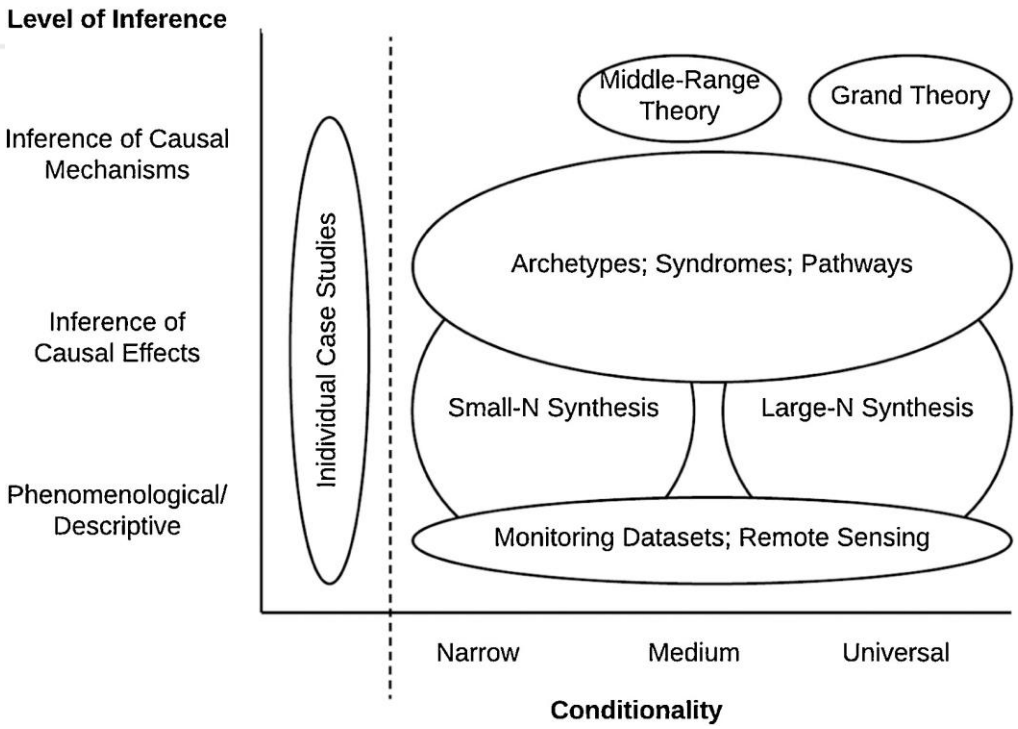
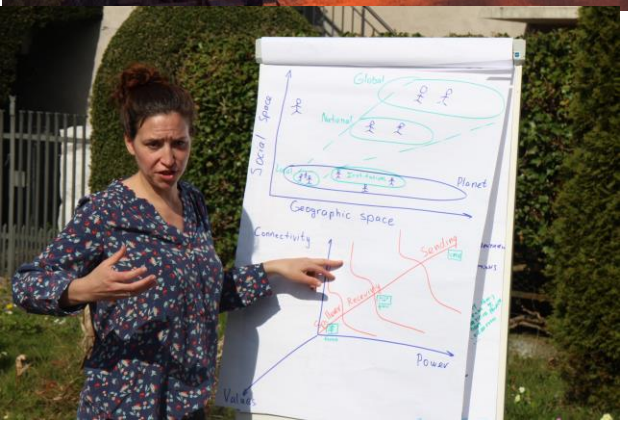
https://doi.org/10.1016/j.gloenvcha.2018.03.003

Type of Generalized Knowledge Claim



GLP Land Theories Workshop
March 2017 Weggis, CH

Middle range theories of land system change



How land system dynamics can be understood through theoretical generalizations of key processes of change and the conditions under which these processes happen

In review, GEC

Emerging issues/challenges for land systems

Changes in climate related to changes in habitat (IPBES report is here)

Managing interactions between used lands and wild/conservation lands

Telecoupling land conflict based on land rights and relations

Competitions for land (SDG trade-offs, sometimes there aren't synergies)

GLP plans for 2018-19

- **Working Groups**
  - **Archetypes: 2nd workshop in Berlin March/Special issue September**
  - **From LC to LU – Workshop late fall 2018 (RS of LSLAs)**
  - **Mountains - Mountain Futures meeting Yunnan June 18; Mountain land change trajectories workshop with LCLUC community (*in planning)***
  - **Telecoupling Young Scholars Workshop April 2018**
- **Nodal Offices**
  - **GLP Asia Conference 'Transitioning to sustainable development of land systems through teleconnections and telecouplings' September 2019**
- **Seedbeds of Transformation in Africa, Port Elizabeth SA May 18**
  - **The role of science with society and the SDGs in Africa (START and FE)**
  - **'Pathways to sustainable land systems: land as the nexus for optimising co-benefits of SDG interactions'**
- **Global Land Forum – International Land Coalition – Indonesia Sept 18**

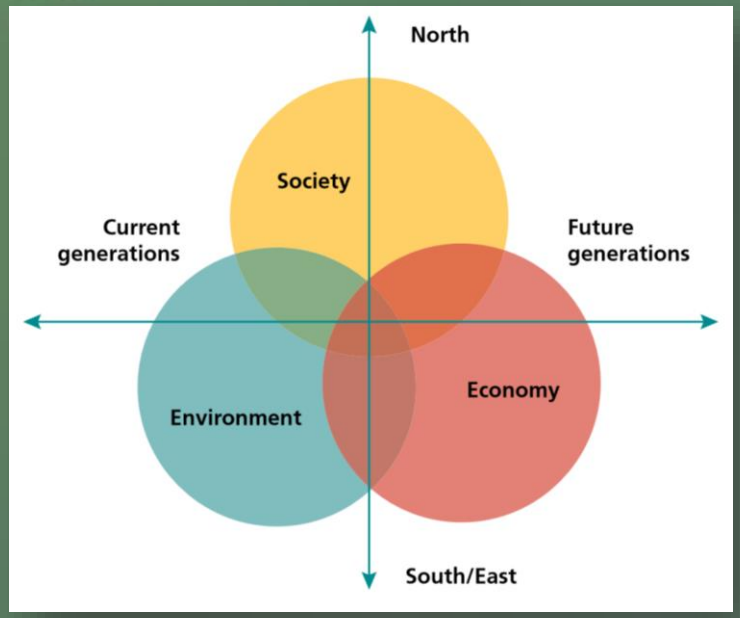
GLP plans for 2018-19

- **OSM2019**
  - **Bern, April 24-26**
  - **Science-Policy component**
  - **Participation of other FE GRPs**
  - **Developing country participation grants**
  - **B2B NASA LCLUC meeting? Joint workshops?**

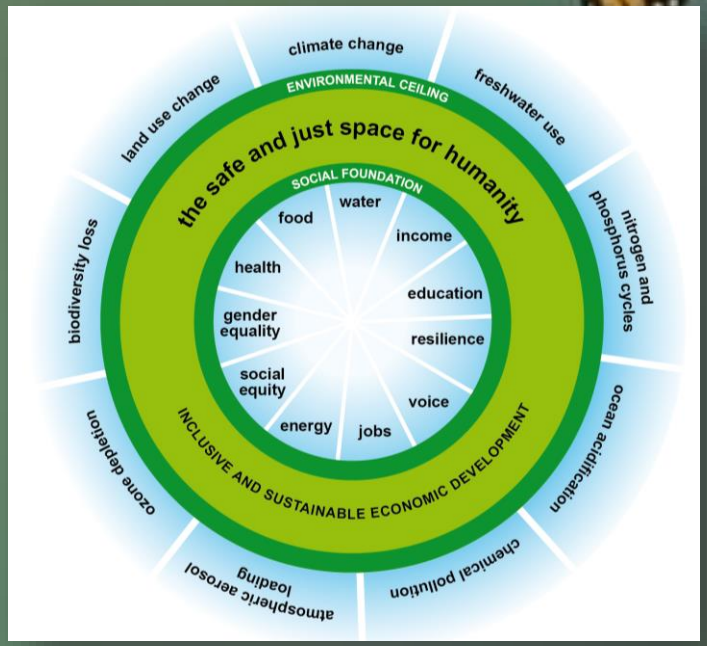
Roadmap

- Global Land Programme (activities, research agenda)
- Recent work/emerging themes/Outlook
- **Land and Agenda 2030 – How can we put land on the global agenda?**
  - **Evolution of SD, transformations, from what to how, role of land systems**

KM 1: From Brundland to 2030 Agenda

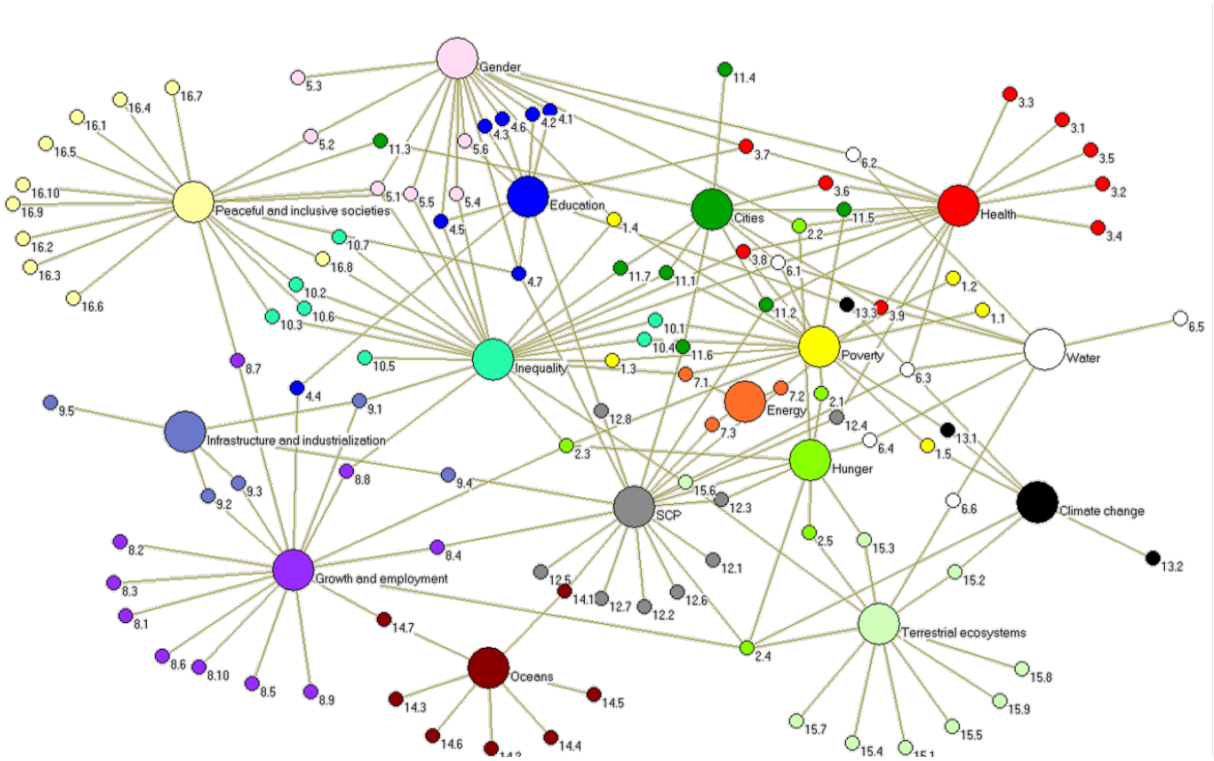


Evolution to SD:
Three pillars, compromises, emergent in space and time



Transformations to SD:
Indivisible, hard choices, intentional, universal and time-bound

KM 2: Transformative Potentials of 2030 Agenda



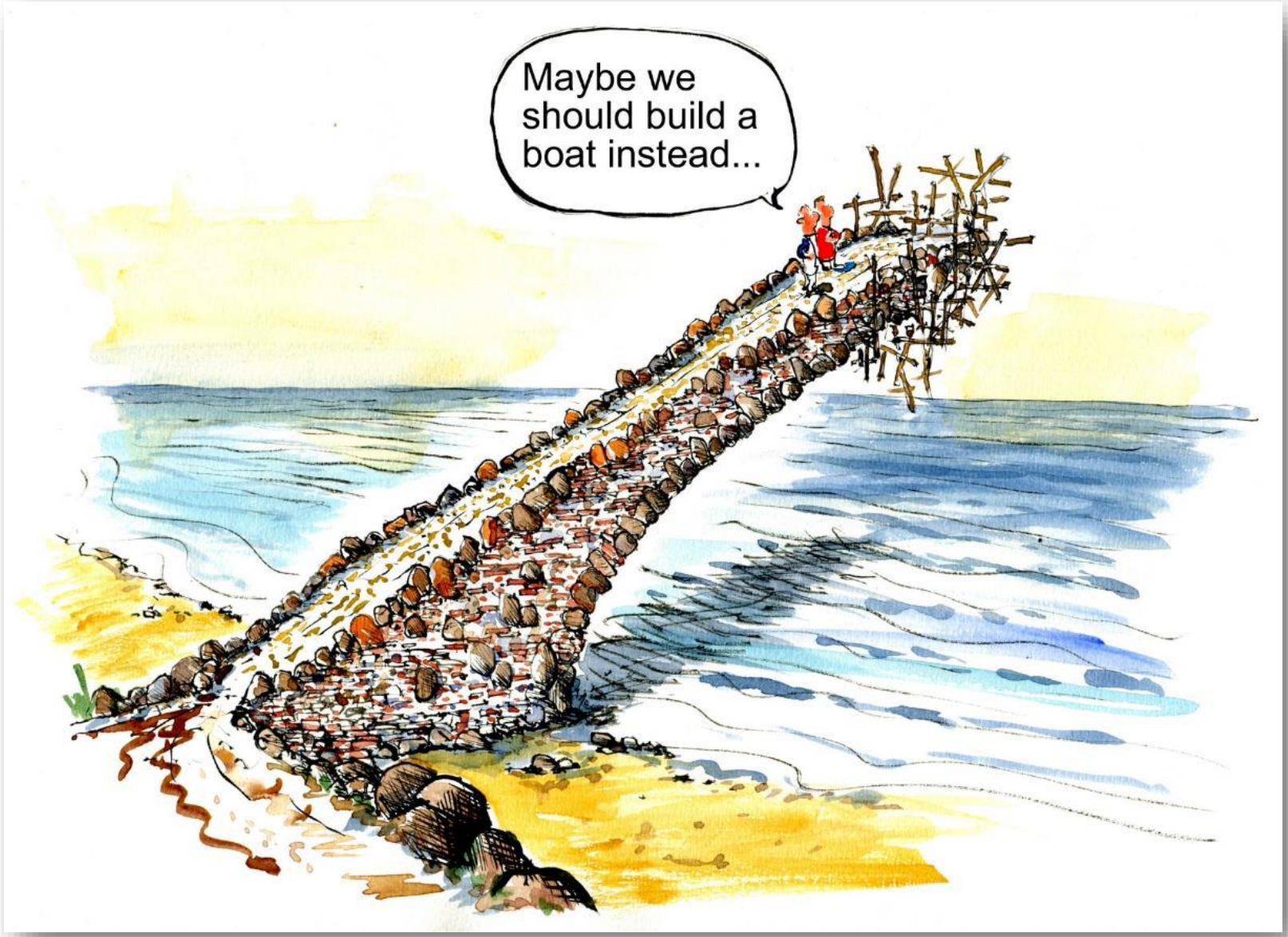
1.Interlinkages: ➔ Challenges Silos? ➔ New Development Pathways!

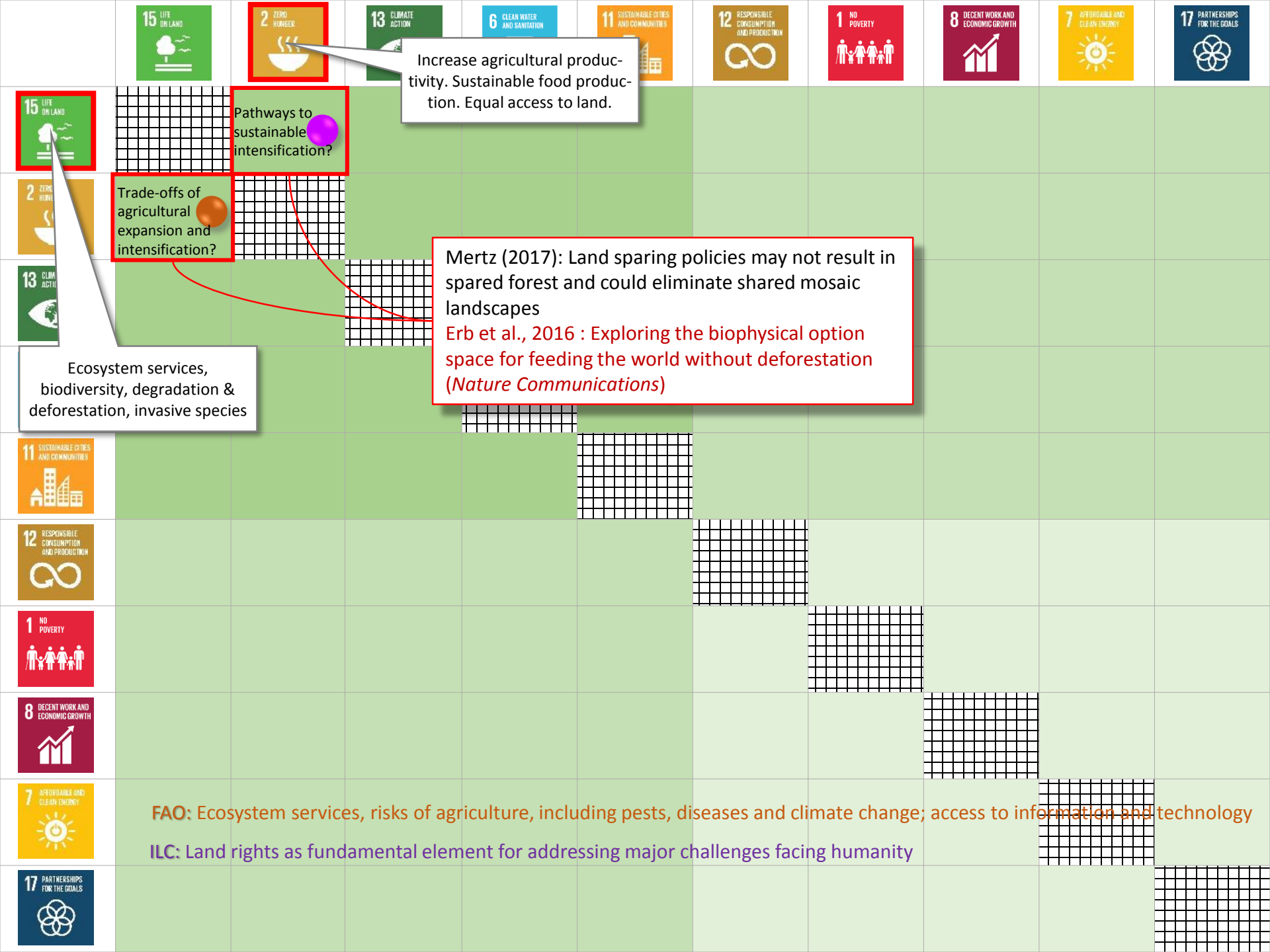
2.Universality: ➔ Autonomy of States? ➔ Lever Across Place & Scale!

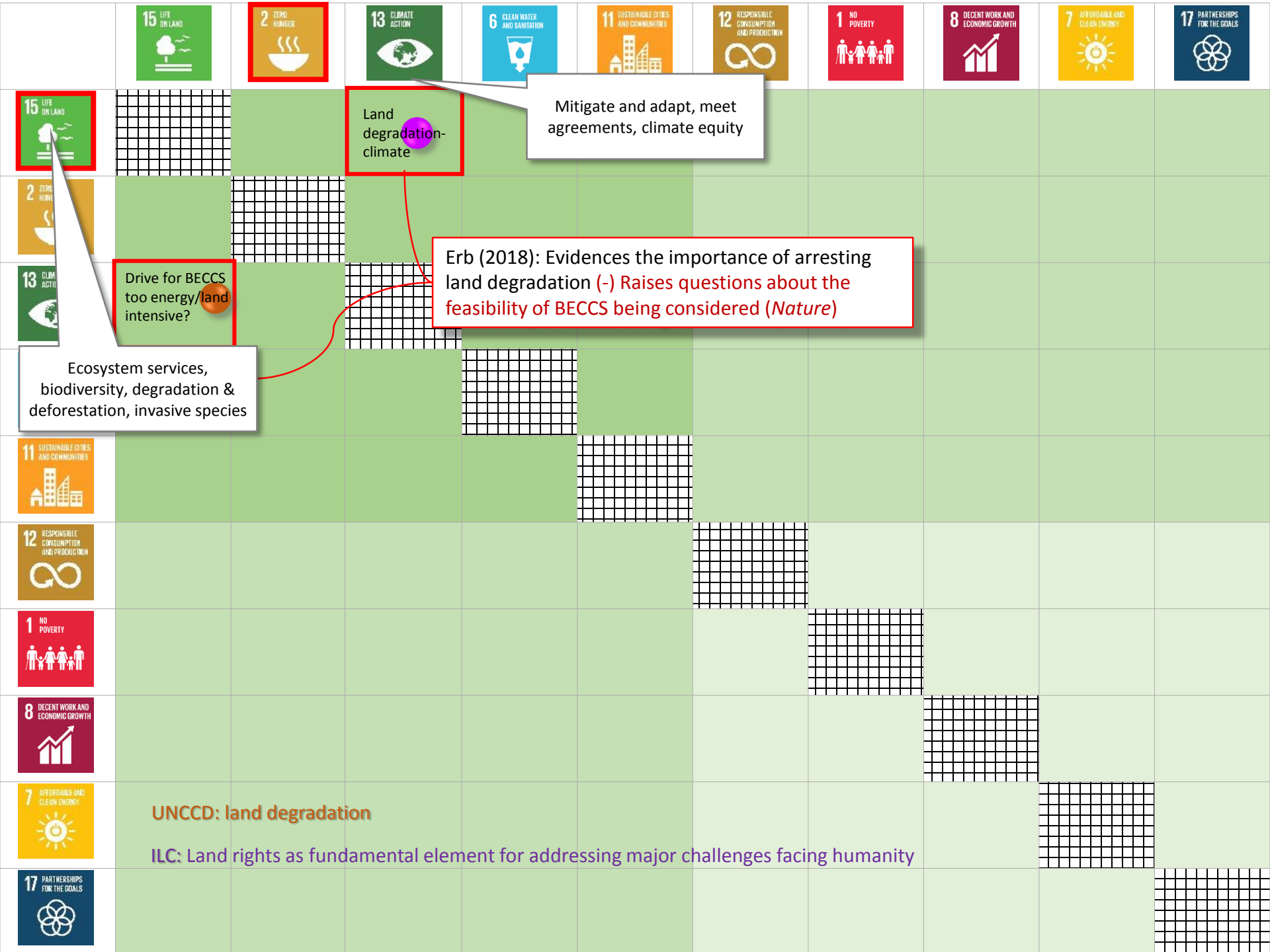
3.New Key Actors: ➔ Development Authorities? ➔ Innovative Partnerships!

KM3: From what to how:

Matching answers to questions/questions to answers




Increase agricultural productivity. Sustainable food production. Equal access to land.
Pathways to sustainable intensification?
Trade-offs of agricultural expansion and intensification?
Mertz (2017): Land sparing policies may not result in spared forest and could eliminate shared mosaic landscapes
Erb et al., 2016 : Exploring the biophysical option space for feeding the world without deforestation (*Nature Communications*)
Ecosystem services, biodiversity, degradation & deforestation, invasive species
FAO: Ecosystem services, risks of agriculture, including pests, diseases and climate change; access to information and technology
ILC: Land rights as fundamental element for addressing major challenges facing humanity


Land degradation-climate
Mitigate and adapt, meet agreements, climate equity
Drive for BECCS too energy/land intensive?
Ecosystem services, biodiversity, degradation & deforestation, invasive species
Erb (2018): Evidences the importance of arresting land degradation (-) Raises questions about the feasibility of BECCS being considered (*Nature*)
UNCCD: land degradation
ILC: Land rights as fundamental element for addressing major challenges facing humanity

closing thoughts:

The great discoveries are coming!

- They will be forged from integrating these global observational systems and connecting them to the ground..

- Together GLP and the NASA LCLUC program are doing research and building vibrant scientific communities around such goals..

that's the frontier..

Putting land on the global agenda is hard but essential - lets keep working at it!

Thank you!

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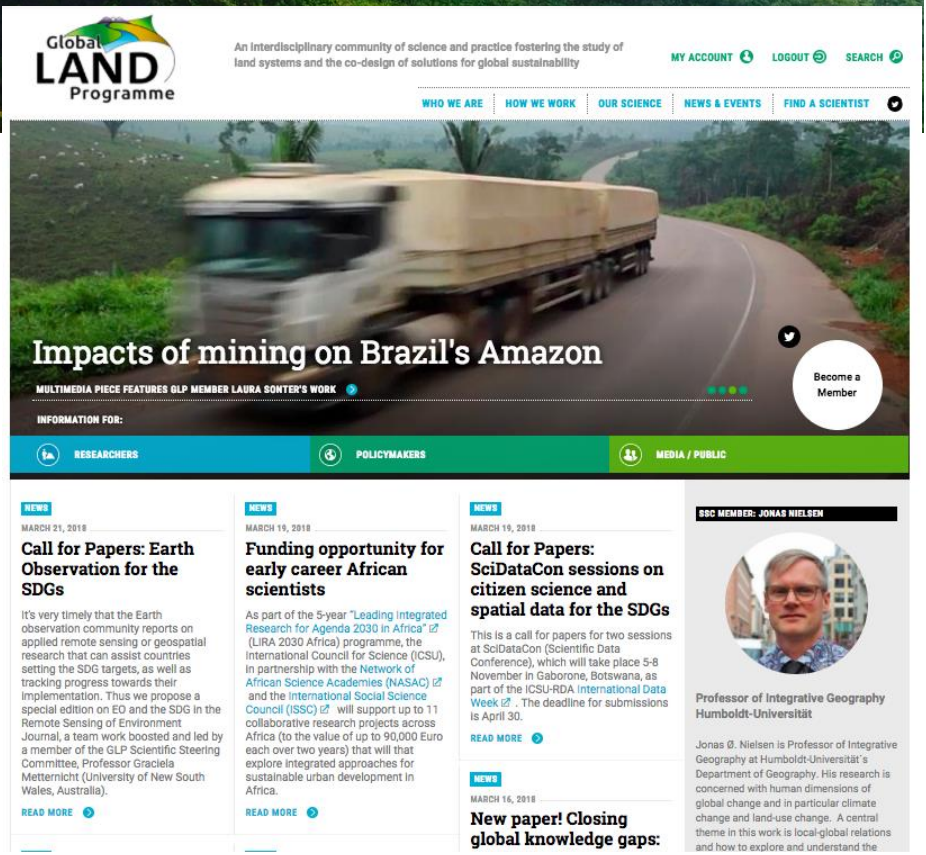
@adebremond

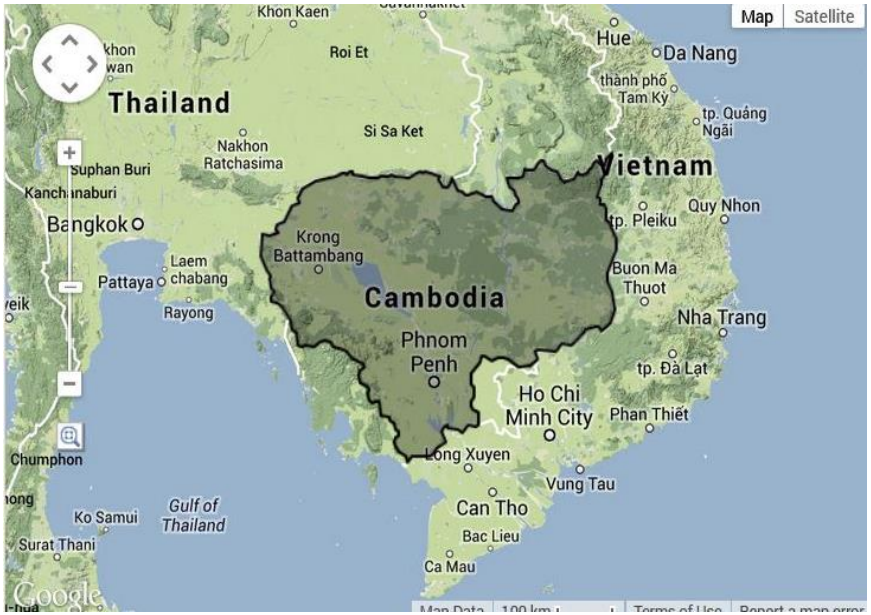


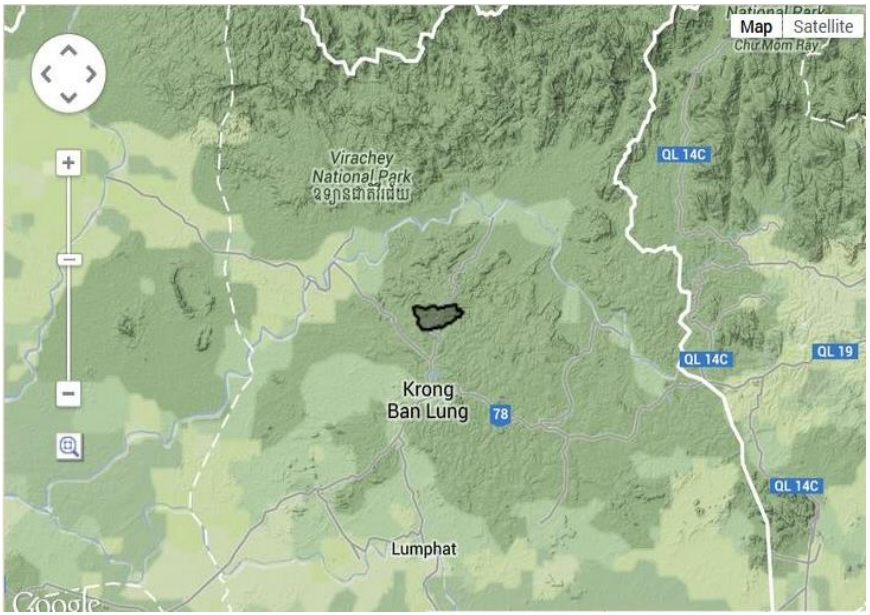
Land System Science

Global Knowledge Synthesis (Metastudy)
Integrating **local case studies** across locations & scales

Global Data Challenges

- ***Scale mismatch*** (Modifiable Areal Unit Problem; MAUP)
- ***Geographic bias*** (Sampling Bias)





In agricultural and natural resources based economies, land puts many, and often competing, interests at stake







One single source of data on key datasets is not enough (one version of reality)

In Myanmar, the situation remains highly conflictual, and the level of trust between key stakeholders is very low

One source of data is not enough

But data and information alone is not enough

Sustainable land management

Goal oriented and equitable decision making

Navigating trade-offs (sectors and scale)

Knowledge

Data / information

Co-production

Thematic and geographic priorities

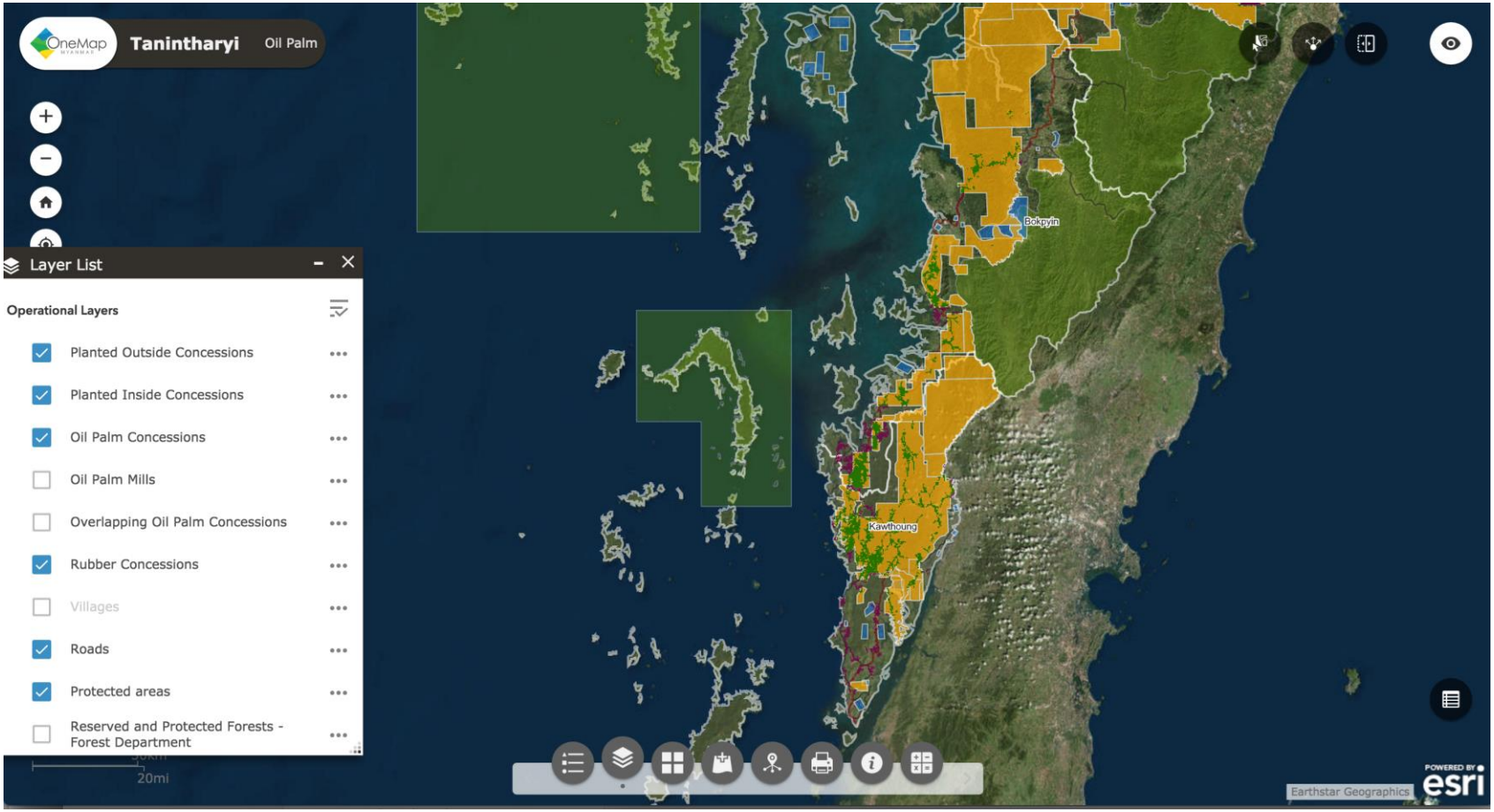
- Thematic Land tenure/ownership/right (□□)
  - Land cover and Land Use, Large scale investments in land (□□)
  - Base maps (roads, rivers, locations, etc) (□□□□□□□□□□□□□□□□□□□□□□ □□□□□□□□□ □□□□□- □□□□□□ □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□ □□□□□□□□□ □□□□□□□□□□□)
  - Population and socioeconomic data (□□□□□□□□□□ □□□□□□ □□□□□□□□□□□□□□□□□□□□□□□□□□□□ □□□□□□□□□□□□□□□□□□□□)

- Geographic (□□□□□□□□□□□□□□□□□□□□□ □□□□□□□□□□□□□□□□):
  - Bago (Taungoo) (□□□□□□□□□□□□□□□□□□□□□□□ □□□□□□□□□□□□□□□□□□□□□□□□□□)
  - Mon (□□□□□□□□□□□□□□)
  - Tanintharyi (□□□□□□□□□□□□□□□□□□□□□□□□□□□□)
  - Nagaland

Example of activities: The case of Palm Oil in Tanintharyi

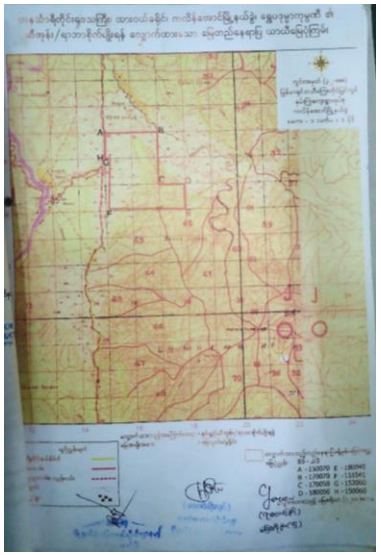
Enabling an evidence-informed multi-stakeholder environment to address complex land issues

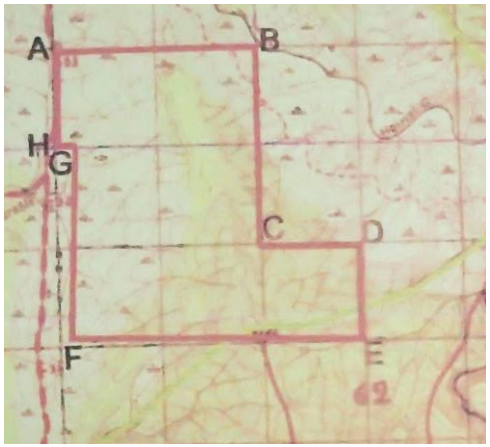
The case of Palm Oil in Tanintharyi

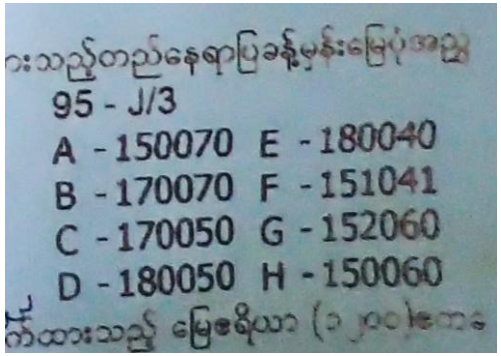


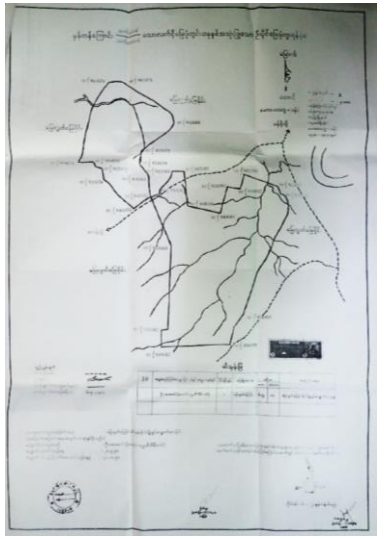
[Link to Web app]

Compiling contract information from different Sources/agencies

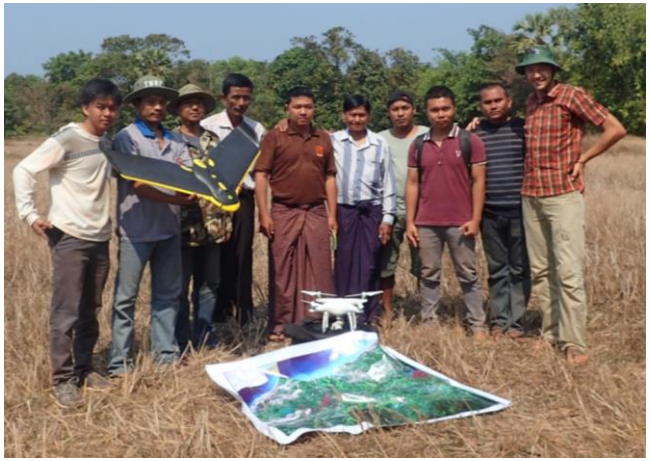




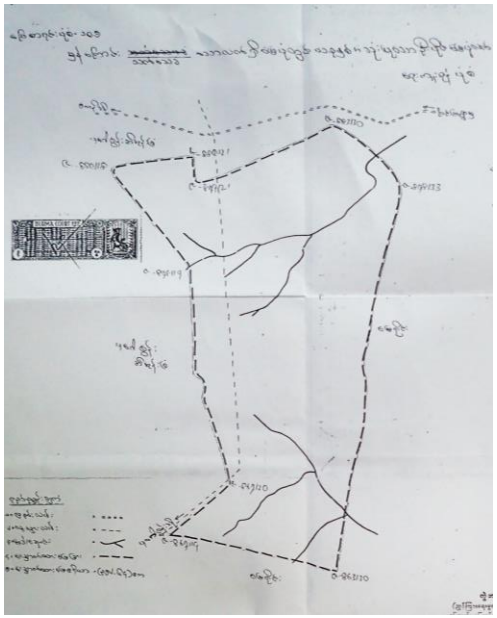


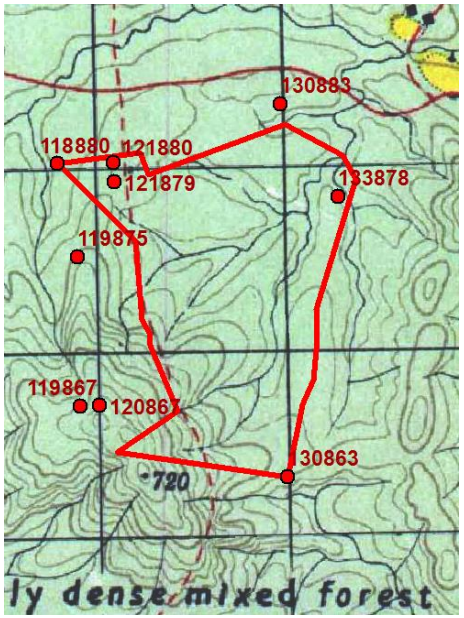


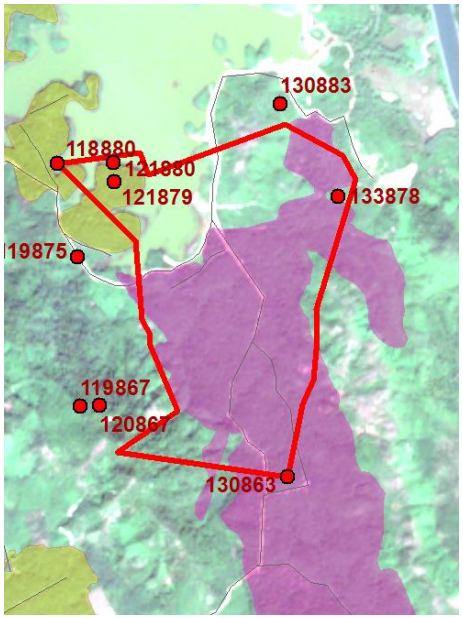
Co-production using technical means



Plantation areas on maps vs reality



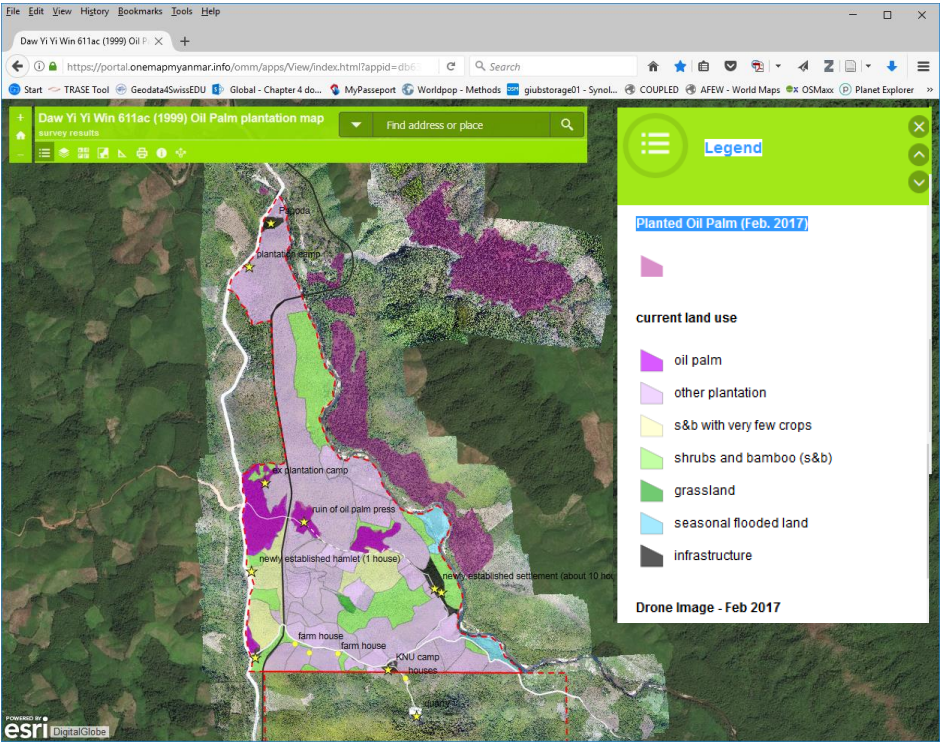




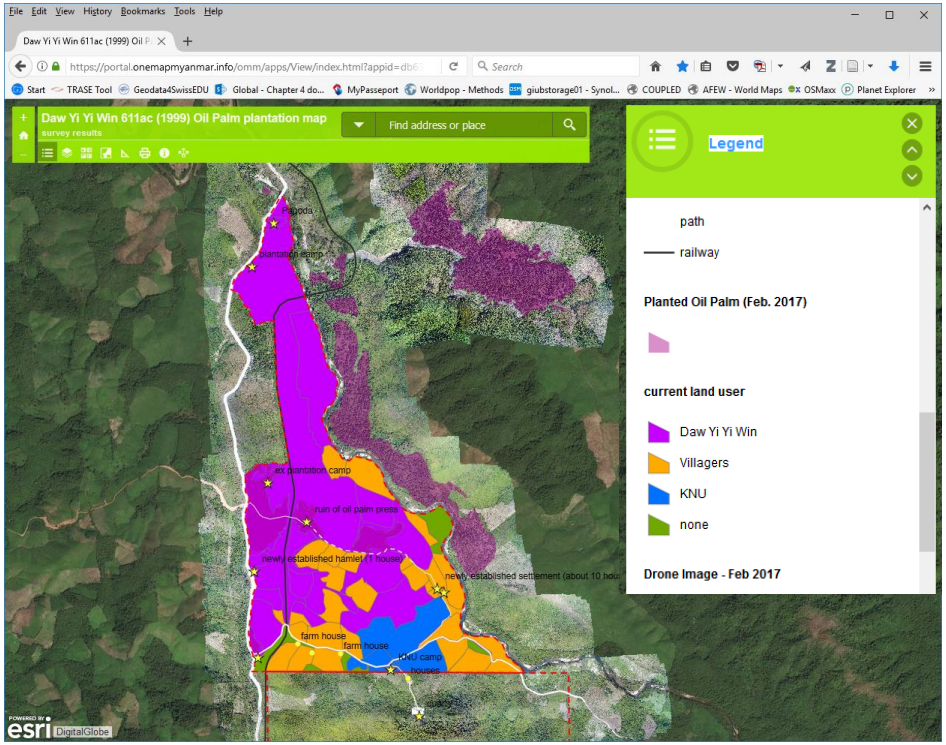
- Sketchmaps with missing or wrong reference
  inevitably will mismatch with reality / real ground/GPS location

Co-production of land use and claims towards navigating conflicts and finding solutions

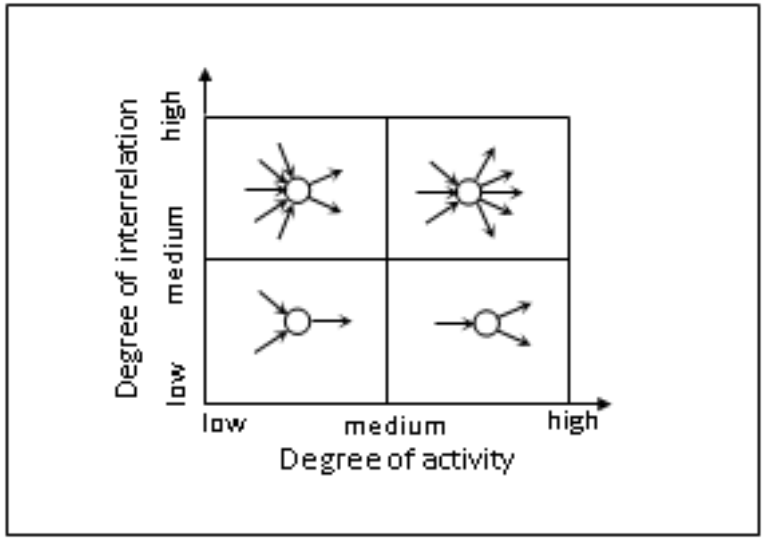
Current land use

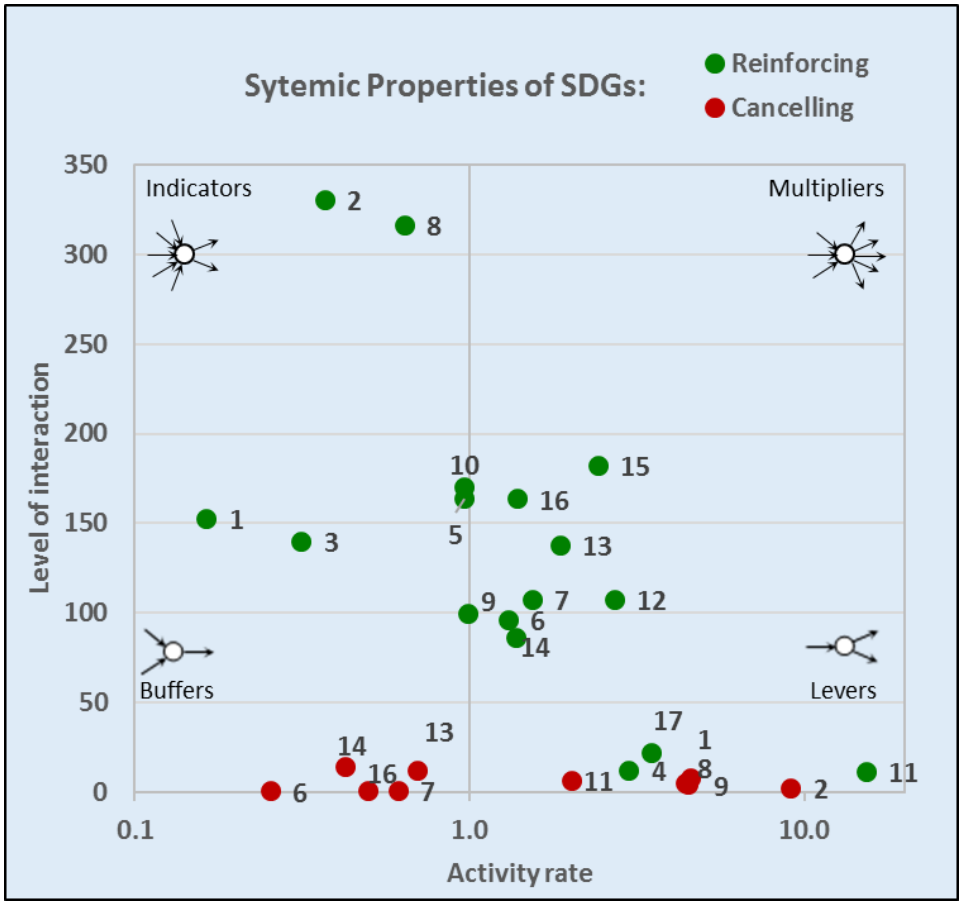


Current land users



Systemic analysis





UNEP 2016 GEO-6 Regional Assessment for Asia and the Pacific.
Regional
12 .2 ➔ 15 .3 : 1
Increasing resource use is causing widespread environmental degradation, loss of ecosystem services.
The region's material consumption has increased sharply over the past four decades, accounting for more than 50 per cent of world consumption while material productivity has not improved and is double the world average.

ICSU 2017 A Guide to SDG Interactions: Global Assessment. Global
15 .3 ➔ 2 .3 :1
Combatting desertification, restoring degraded land, and reducing the impact of invasive species as well as fair and better access to genetic resource enable sustainable agriculture

ICSU 2017 A Guide to SDG Interactions: Global Assessment
Global 2 .3 ➔13 .1 : -2
Unsustainable agriculture focusing solely on productivity may counteract climate adaption by increasing climate instability and extreme events

Participatory mapping and documentation of customary lands in Nagaland

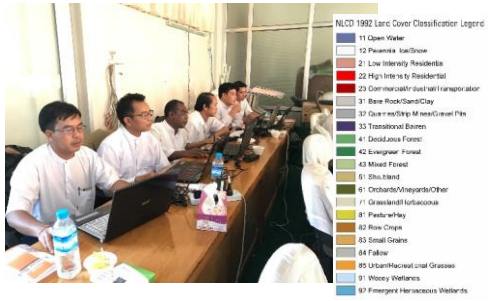
Co-production of knowledge: Putting shifting cultivation on the map

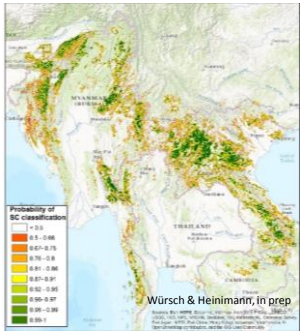
Support communities documenting their land resources (aim n> 70)

Understand local contexts through case studies and engagement with Local communities

Strategically work with policy makers at all levels to alter policies and zonings

Work with technical staff in gvt





Use new technologies to put SC on the map