Bunga rampai dari kebun lindung

Anthology of blogs and grams

in the 25th year of ICRAF SE Asia

Meine van Noordwijk

World Agroforestry Centre

Bunga rampai dari kebun lindung: anthology of blogs and grams in the 25th year of ICRAF Southeast Asia

Meine van Noordwijk

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World Agroforestry Centre (ICRAF), Bogor, Indonesia

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'Kebun lindung' connects the concepts of farmer-managed 'kebun' with the protective functions of 'hutan lindung', mostly on slopes

An anthology, or collection of wild flowers, is presented as 'bunga rampai' in Bahasa Indonesia

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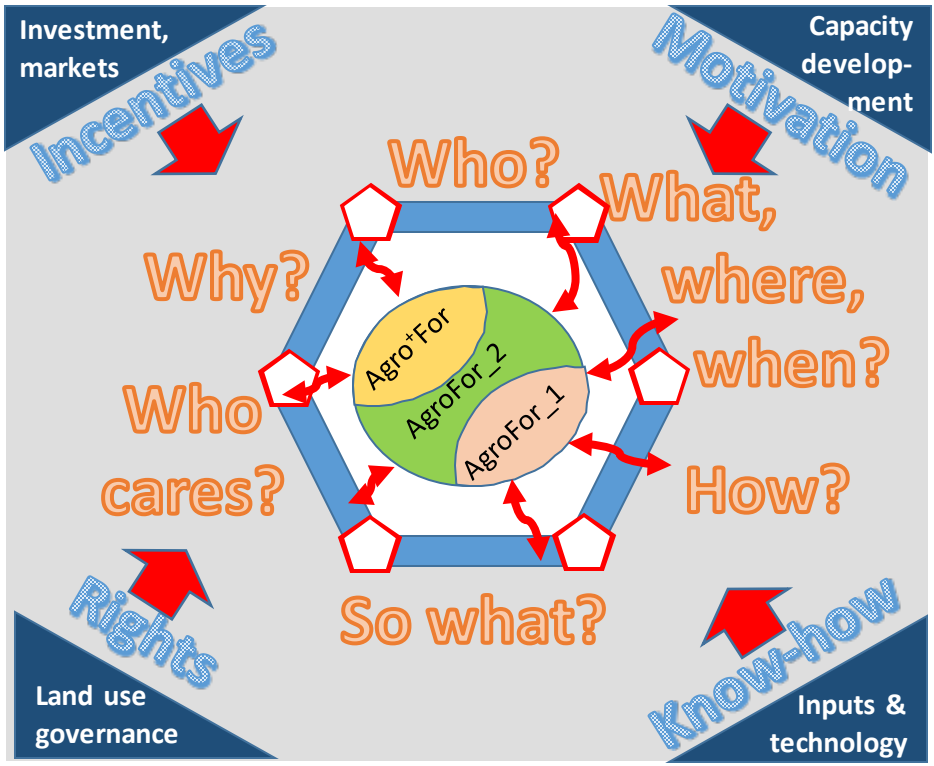
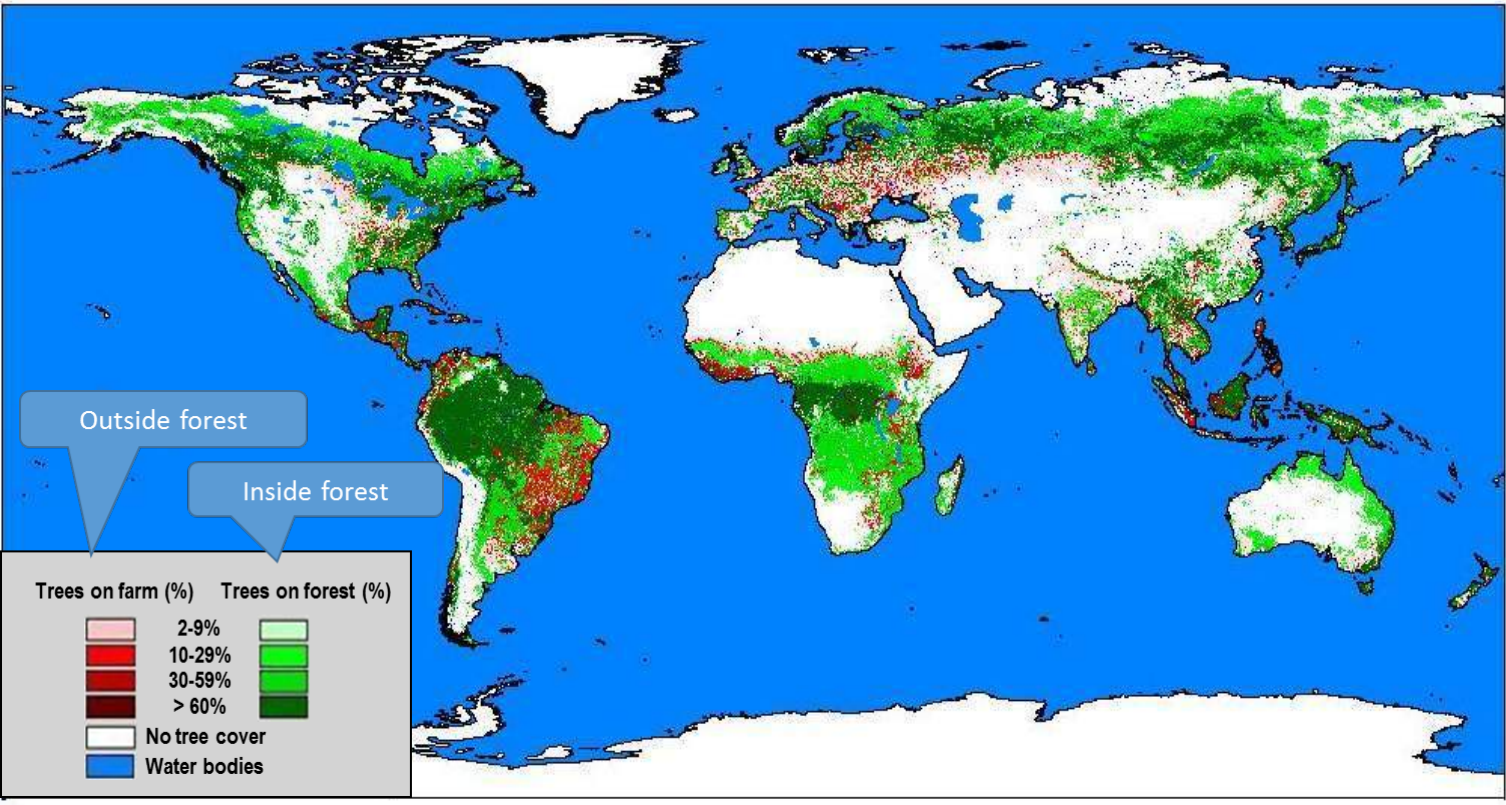
2017

Transforming lives, and landscapes
and understanding of ourselves



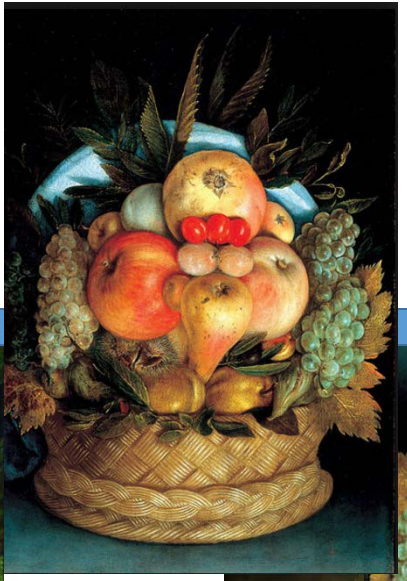
1 interconnected world
2 parents: agriculture & forestry
3 agroforestry paradigms, knowledge systems
4 intervention arena's
5 asset (capital) types
6 key system questions
17 Sustainable Development Goals


Outside forest
Inside forest
Trees on farm (%)
Trees on forest (%)
2-9%
10-29%
30-59%
> 60%
No tree cover
Water bodies

1526 or 1527 – 1593

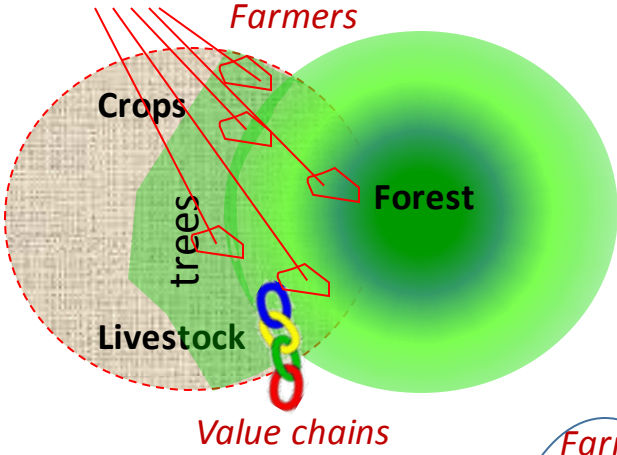
Giuseppe Arcimboldo

Healthy farm(er)s, healthy food



healthy consu-mers

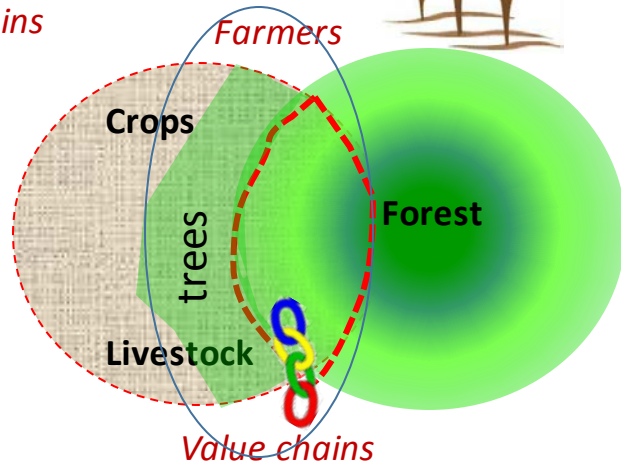
Agroforestry_1 A set of specific practices that combine trees, crops and/or livestock



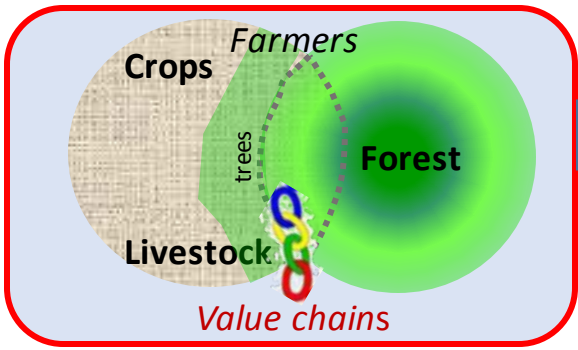
Technology, Trees

Landscapes, People

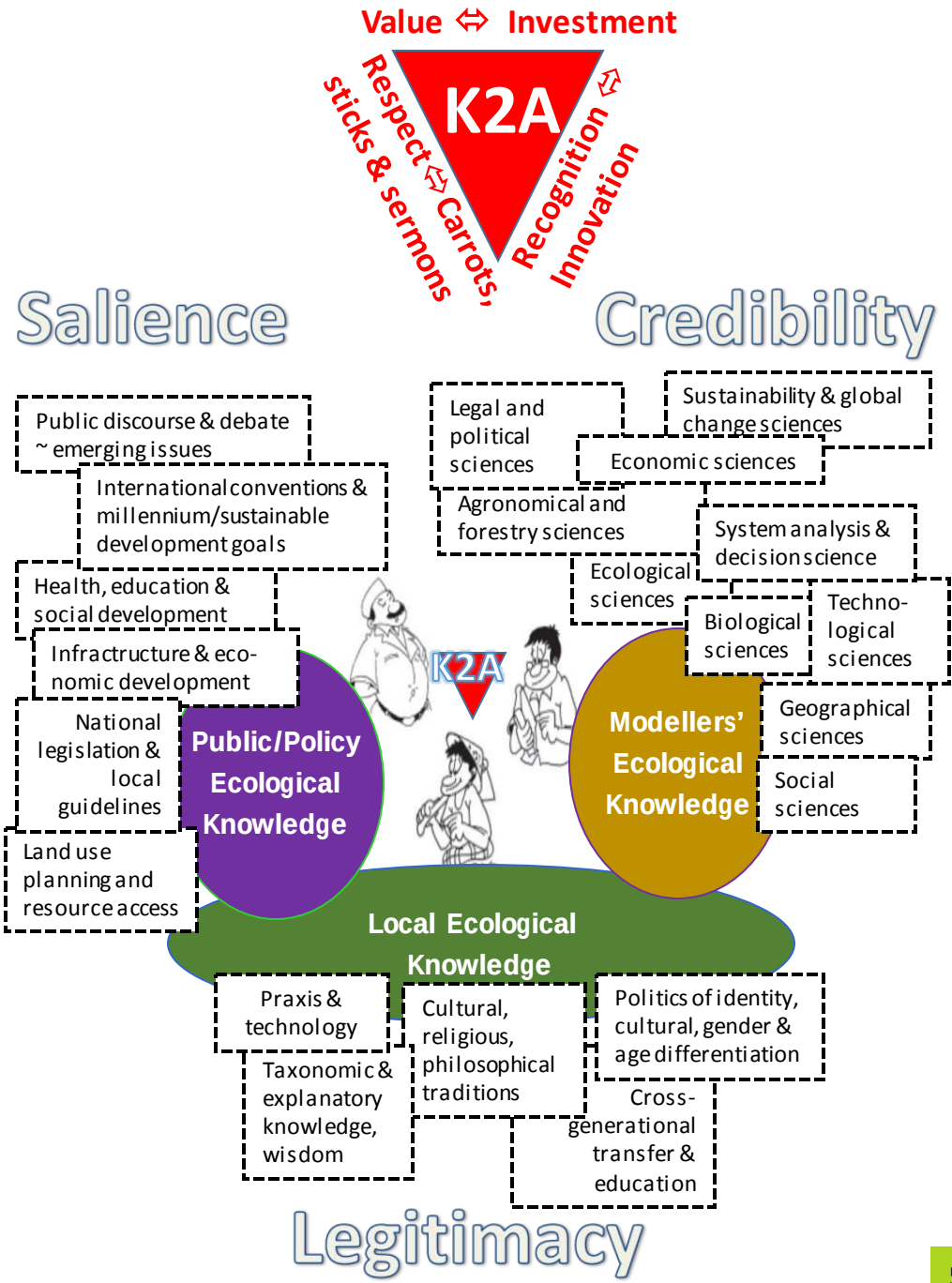
Agroforestry_2
The intersection of farmers and forest + all trees in agricultural and multi-functional landscapes



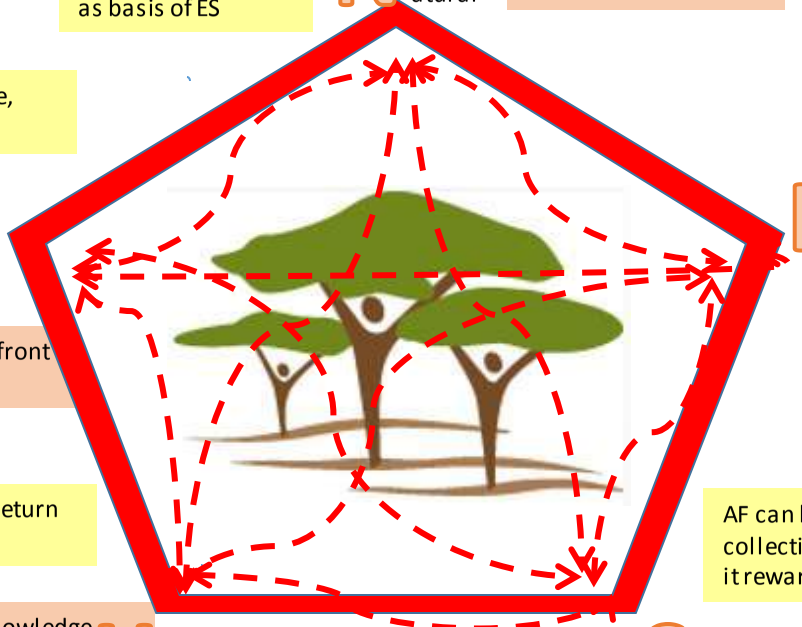
Agro⁺forestry_3 The combination and interface of all agriculture and forestry issues, without institutional barriers



Operating between three knowledge systems: LEK+MEK+PEK



Five assets (capitals) define development through their interactions, agroforestry relates to all 5



AF helps pro-tect N as basis of ES

N atural

AF performance depends on N

AF can protect I by increasing slope stability (reducing landslide risk); reducing flooding; reducing wind damage; improving microclimate

AF is profitable, hedges risk,

F inancial

I nfrastructure (built-up)

AF requires upfront investment

Marketing AF products depends on physical access

AF gives good return to labour

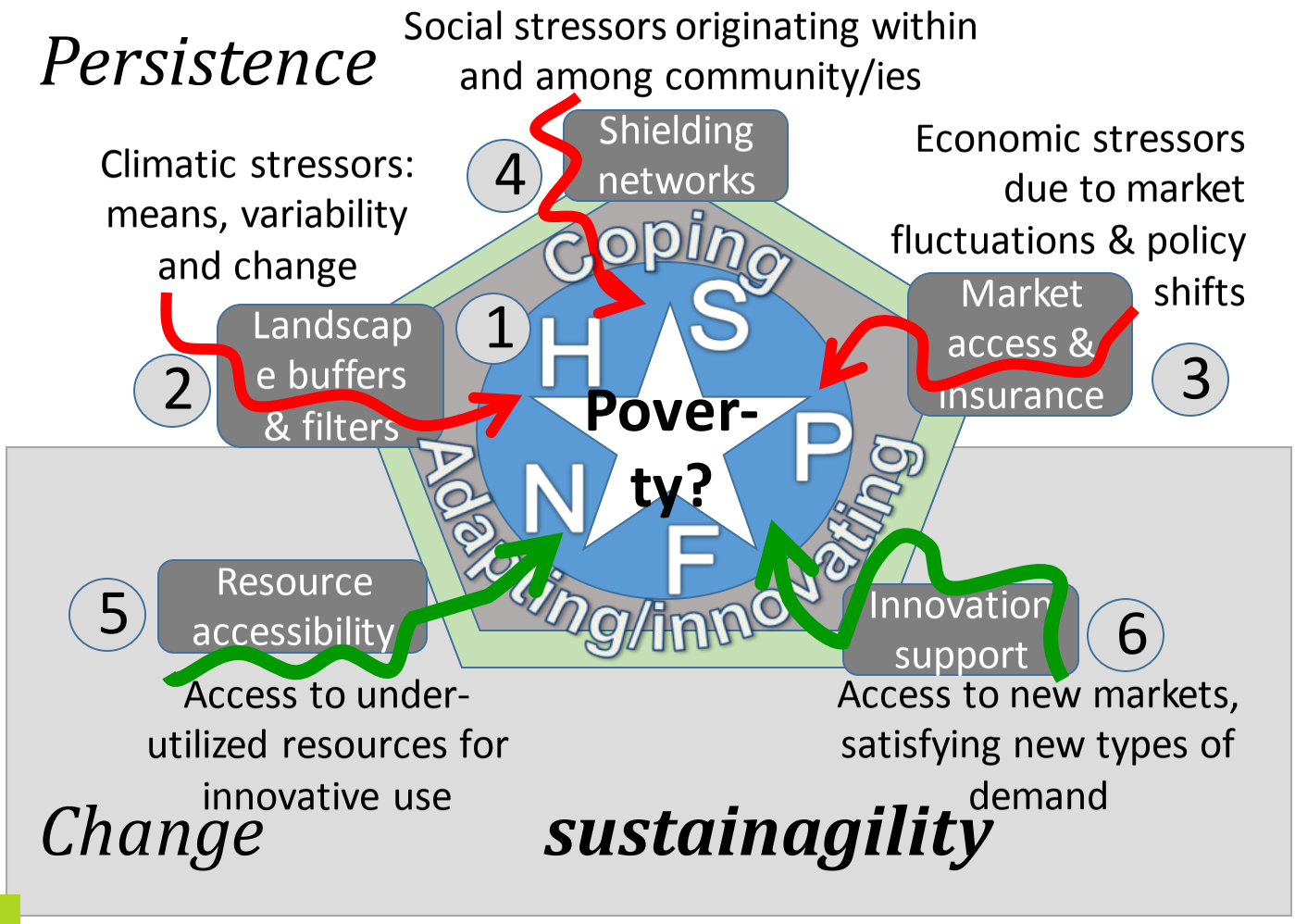
AF can be used to increase collective action and make it rewarding for all

AF is knowledge intensive

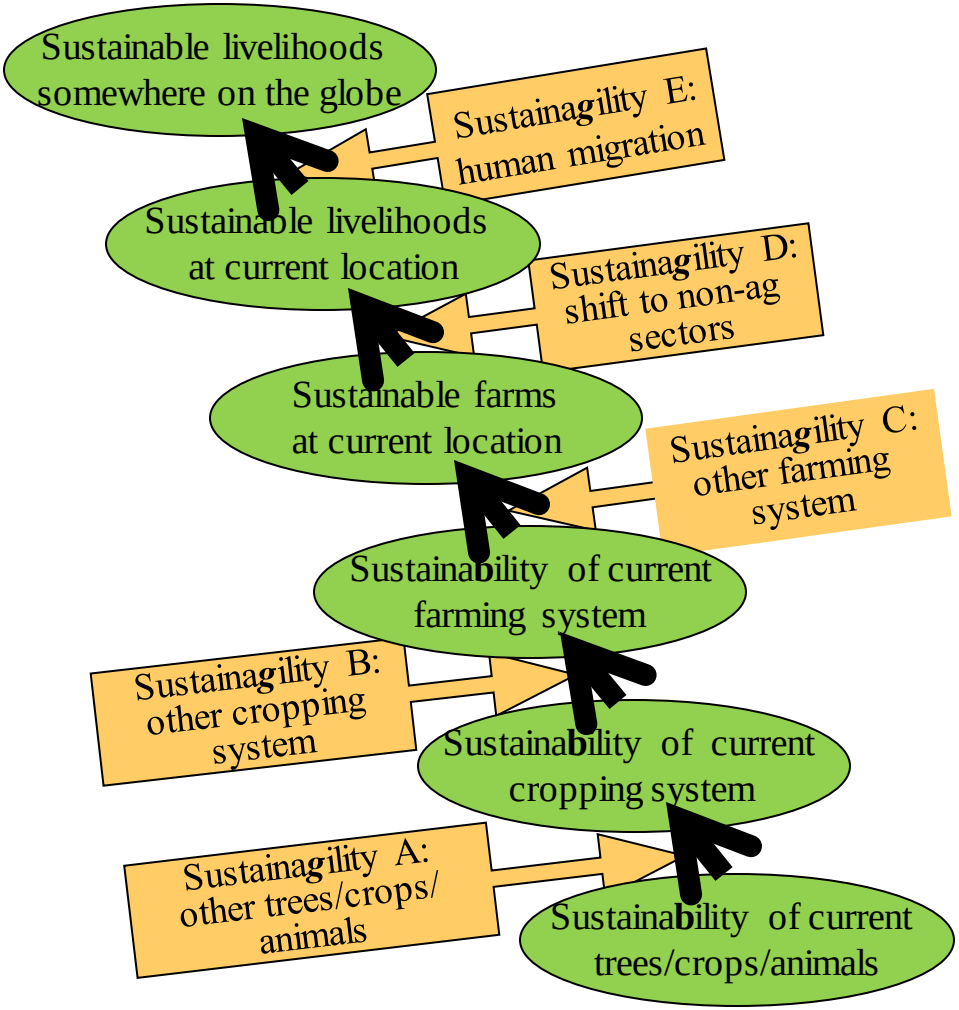
H uman

S ocial

AF depends on social norms

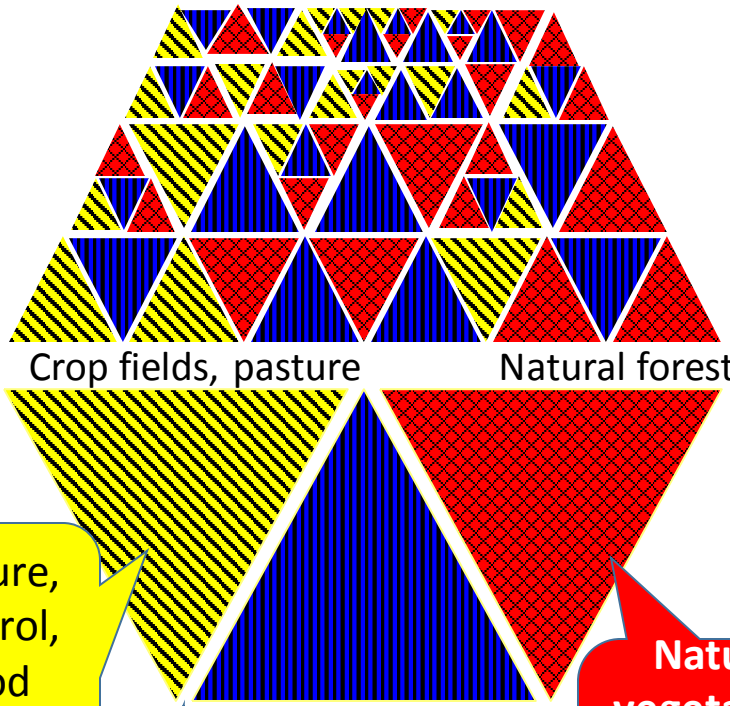

Persistence
Social stressors originating within and among community/ies
Climatic stressors: means, variability and change
Economic stressors due to market fluctuations & policy shifts
4
Shielding networks
Coping
1
H
S
Landscape buffers & filters
2
Market access & insurance
3
Pover-ty?
P
N
F
Adapting/innovating
5
Resource accessibility
Innovation support
6
Access to under-utilized resources for innovative use
Access to new markets, satisfying new types of demand
Change
sustainagility

Sustainagility refers to the resource base for human agility:
Sustainability is based on 'persistence' and 'change'.



Integrate

Agroforestry



Agro-

Fores-

Tree

Culture, control, food security, profita-bility

Natural vegetation, biodiversity , wilderness

Product value chains

Segregate

Contextualized options

Theory of Place

Why is land use what it is? What are the drivers of current human activity and what are levers (regulatory framework, economic incentives, motivation) for modifying future change?

Who makes a living here,what is their ethnic identity, historical origin, migrational history, claims to land use rights, role in main value chains,what are key power relations? Any aspect gender specific?

How are forests and trees used? **What** land use patterns with or without trees are prominent in the landscape and provide basis for local lives, livelihoods and associated value chains?

Socio-ecological System dynamics

Who cares, who is affected by or benefits from the changes in tree cover and associated ecosystem services? How are stakeholders organized and empowered to get leverage & influence the drivers? Are both genders empowered?

So what? How do ecosystem services (provisioning, regulating, cultural/ religious, supporting) depend on tree cover and the spatial organization of the landscape?Gender specificity of appreciation and dissatisfaction?

Where are remaining forests and planted trees? Since **when**? How does tree cover vary in the landscape (patterns along a typical cross-section, main gradients), and how has it decreased and increased over time?

Theory of Change

Generic options

Science ➔ Project management terms

Degradation Restoration

Stop ➔ active

Why? ➔ **approach**

Drivers of current/recent/ past degradation?

Change of rules, incentives, motivation?

Who? ➔ **actors**

Who are actors and stakeholders of what led to egradation?

Free and Prior Informed Consent?

What? ➔ **means**

What land uses, options for change?

Δland use, value chains?

Where? ➔ **targets**

Landscape configuration, lateral flows, buffers, filters?

Spatial zoning?

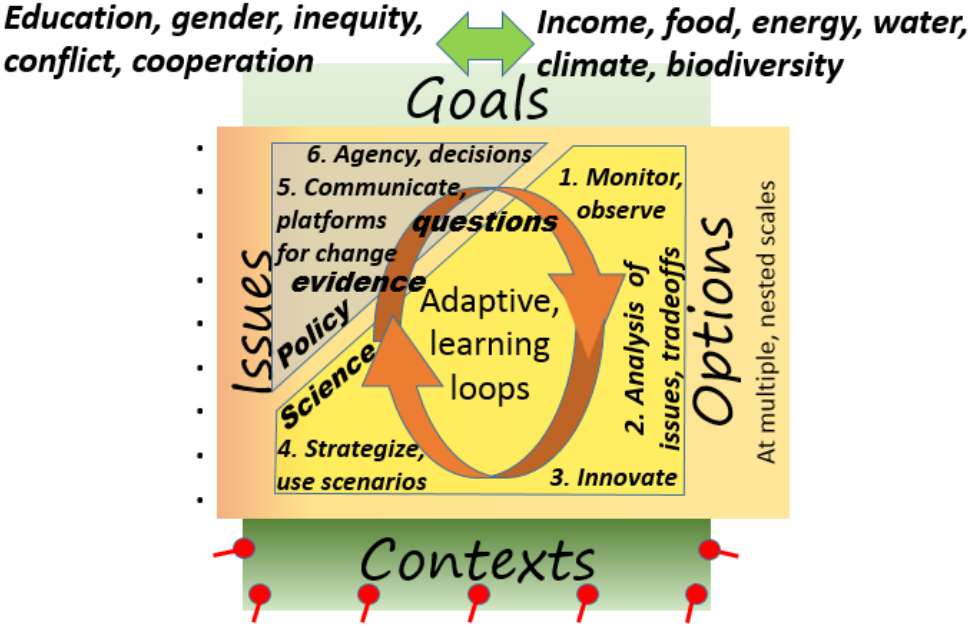
So what? ➔ **objectives**

Ecosystem service change?

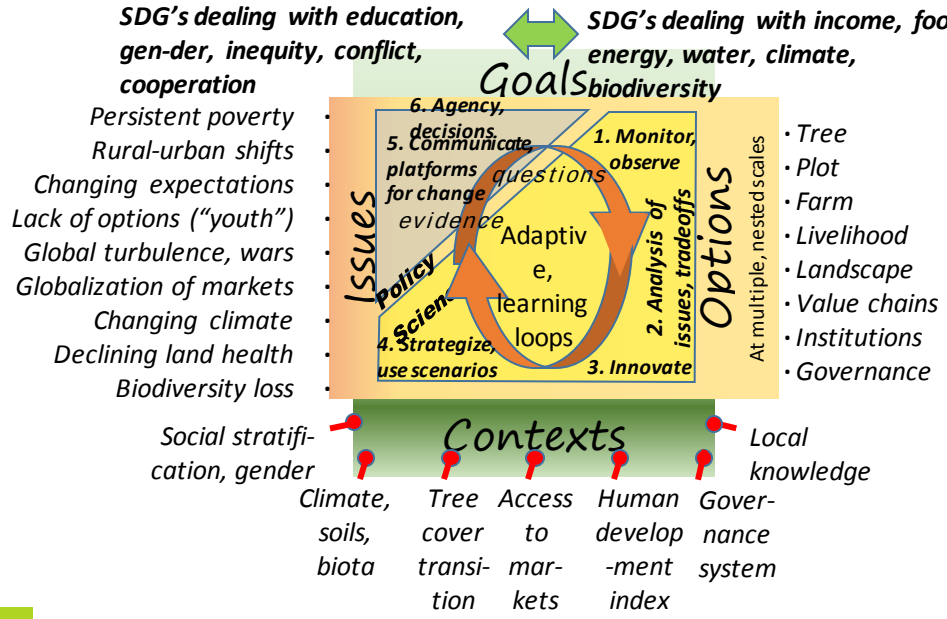
Common but differentiated responsibility across scales

Who cares? ➔ **co-investment**

6 questions on socio-ecological system feedbacks


Education, gender, inequity, conflict, cooperation
Income, food, energy, water, climate, biodiversity
Goals
6. Agency, decisions
5. Communicate, platforms for change
1. Monitor, observe
questions
evidence
Policy
Science
Adaptive, learning loops
2. Analysis of issues, tradeoffs
4. Strategize, use scenarios
3. Innovate
Issues
Options
At multiple, nested scales
Contexts

For example,


SDG's dealing with education, gen-der, inequity, conflict, cooperation
SDG's dealing with income, food, energy, water, climate, biodiversity
Goals
Persistent poverty
Rural-urban shifts
Changing expectations
Lack of options ("youth")
Global turbulence, wars
Globalization of markets
Changing climate
Declining land health
Biodiversity loss
6. Agency, decisions
5. Communicate, platforms for change
1. Monitor, observe
questions
evidence
Policy
Scien
Adaptiv e, learning loops
2. Analysis of issues, tradeoffs
4. Strategize, use scenarios
3. Innovate
Issues
Options
At multiple, nested scales
Tree
Plot
Farm
Livelihood
Landscape
Value chains
Institutions
Governance
Social stratifi-cation, gender
Contexts
Local knowledge
Climate, soils, biota
Tree cover transi-tion
Access to mar-kets
Human develop-ment index
Gover-nance system

A. Diagnosis (context)

B. Innovation (options)

C. Action

Tradeoff analysis

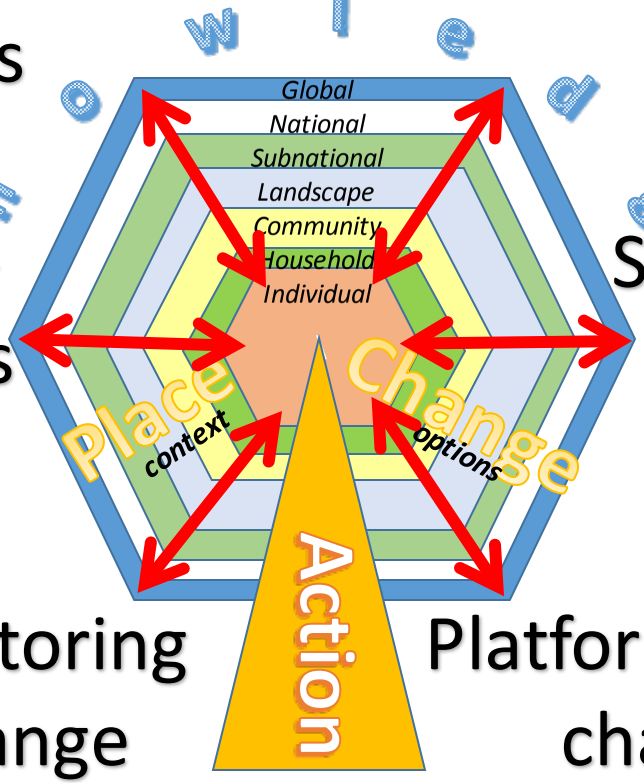
Innovation

Conse-Quences

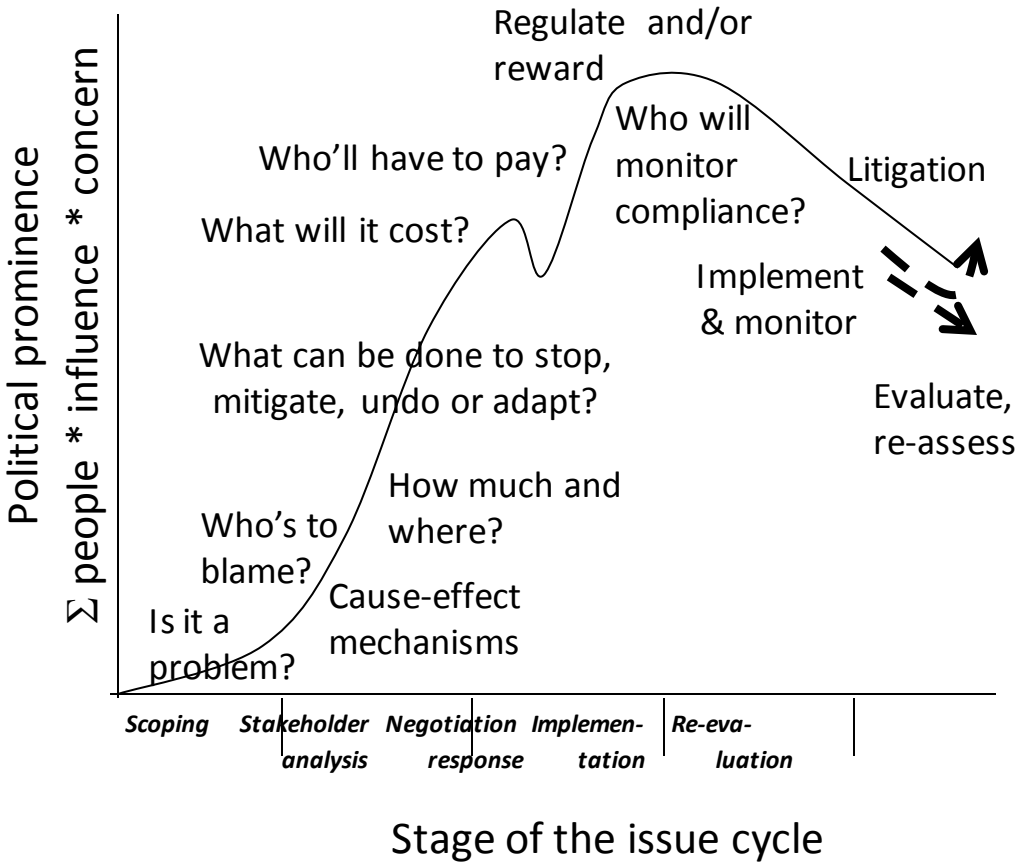
Scena-rios

Monitoring change

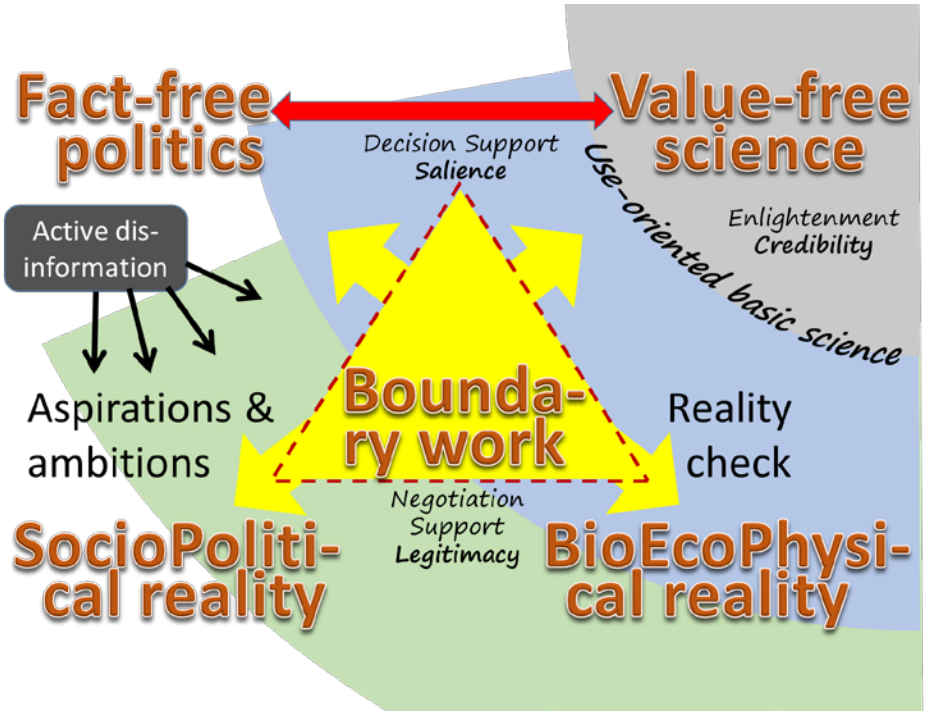
Platforms for change

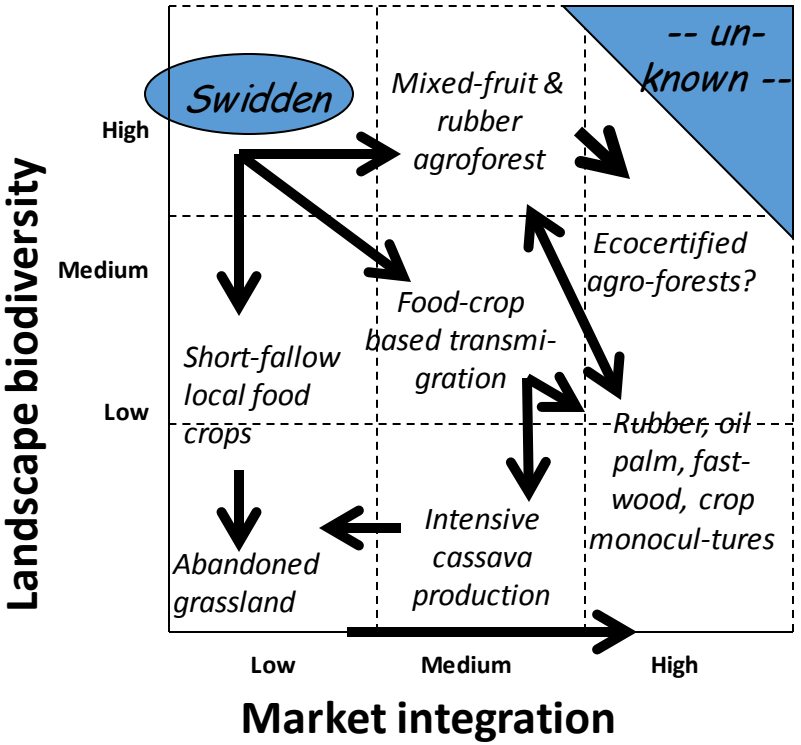


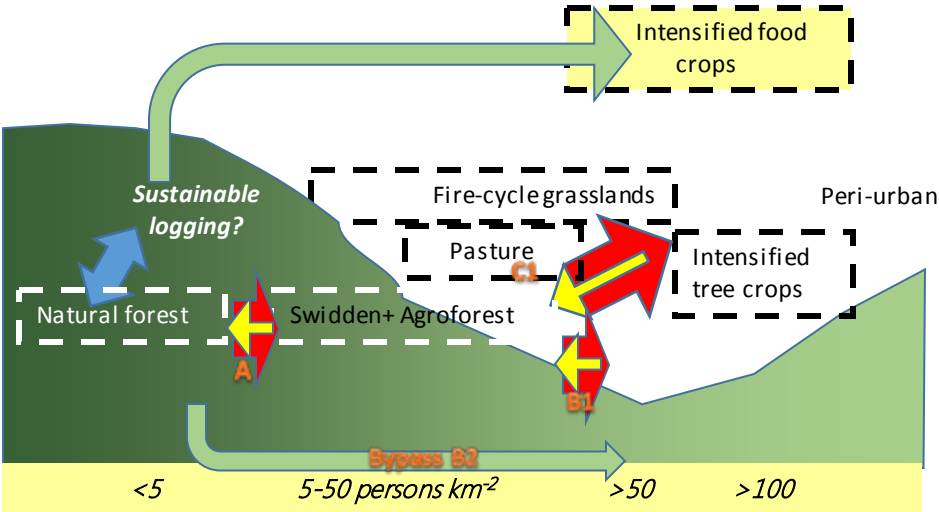
In public debate issues come and go, with a recognizable pattern of questions that research can try to answer (too late…) or anticipate (ahead of funding…)



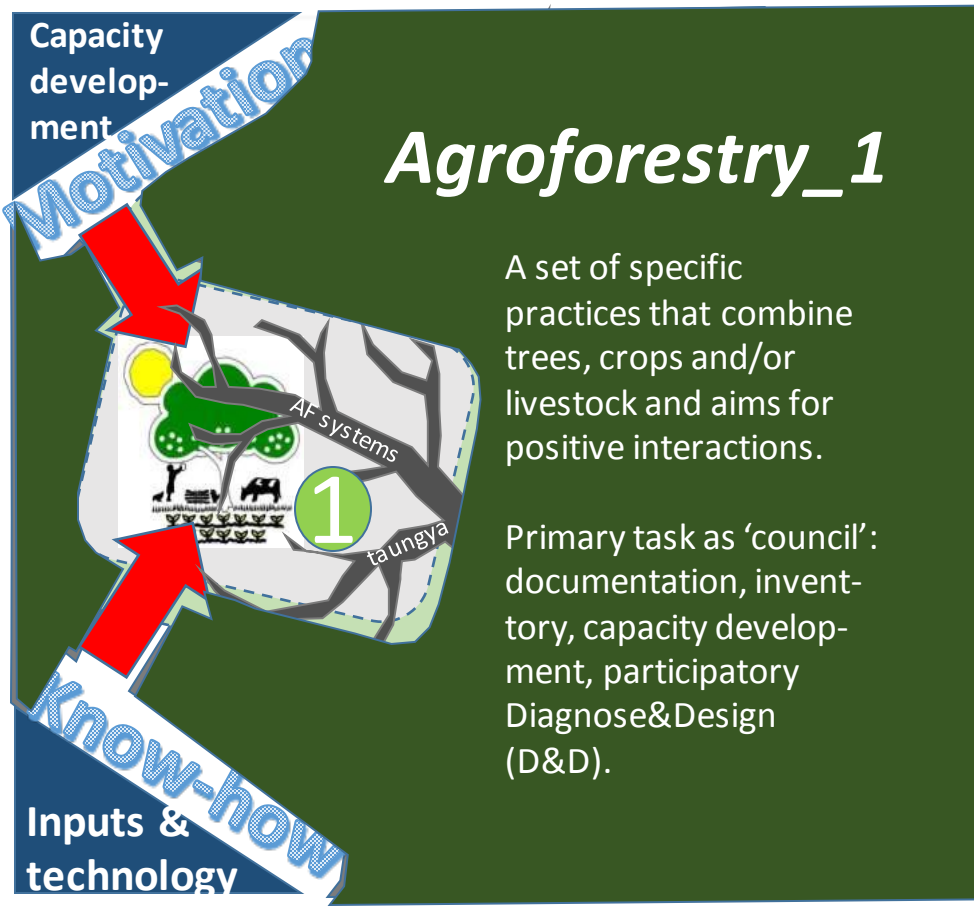
Linking Knowledge with Action




-- un-known --
Swidden
Mixed-fruit & rubber agroforest
Ecocertified agro-forests?
Food-crop based transmi-gration
Short-fallow local food crops
Rubber, oil palm, fast-wood, crop monocul-tures
Intensive cassava production
Abandoned grassland
High
Medium
Low
Landscape biodiversity
Low
Medium
High
Market integration


Intensified food crops
Sustainable logging?
Fire-cycle grasslands
Peri-urban
Pasture
C1
Intensified tree crops
Natural forest
Swidden+ Agroforest
A
B1
Bypass B2
<5
5-50 persons km-2
>50
>100

Section 1. A few years before ICRAF was founded in 1978, the term 'agroforestry' emerged from discussions on the need for a new orientation in forestry, a critique on green revolution agriculture and the realization that trees are important as part of many farming systems.



Around 1990 ICRAF shifted towards being a 'research centre' with tree improvement, technology testing, agroforestry systems and tree-crop interactions as focus.

AF1

- Indonesia: multifunctional landscapes with forest-agroforest-agriculture gradient

The trouble with agriculture and how to fix it

By Rob Finlayson 4/19/2013

Treeless fields of wheat haven't always been the common image of agriculture. For most of human history, agriculture took place amidst trees. It's time to put the trees back, *say Meine van Noordwijk, Dennis Garrity and Delia Catacutan*

The trouble started when a tree-less, tillage-addicted form of agriculture became the norm and the image worldwide as what agriculture is, and should be, and was extended to parts of the world with less benign climates than where it originated. Long before this concept took hold, agricultural practices in many parts of the world included the retention of valuable trees in cropped fields. This kind of agriculture employed only superficial soil tillage, usually in combination with a controlled fire that cleared the land but did not kill the larger trees.

Read further

Sugar, women, wine, money, men and orangutan

By Rob Finlayson 11/23/2012

We need a sophisticated understanding of how socio-ecological systems interact with markets, policies and cultural norms before we can identify potential improvements to agroforestry systems that have provided livelihoods for farmers for many centuries, *say Meine van Noordwijk and Endri Martini*

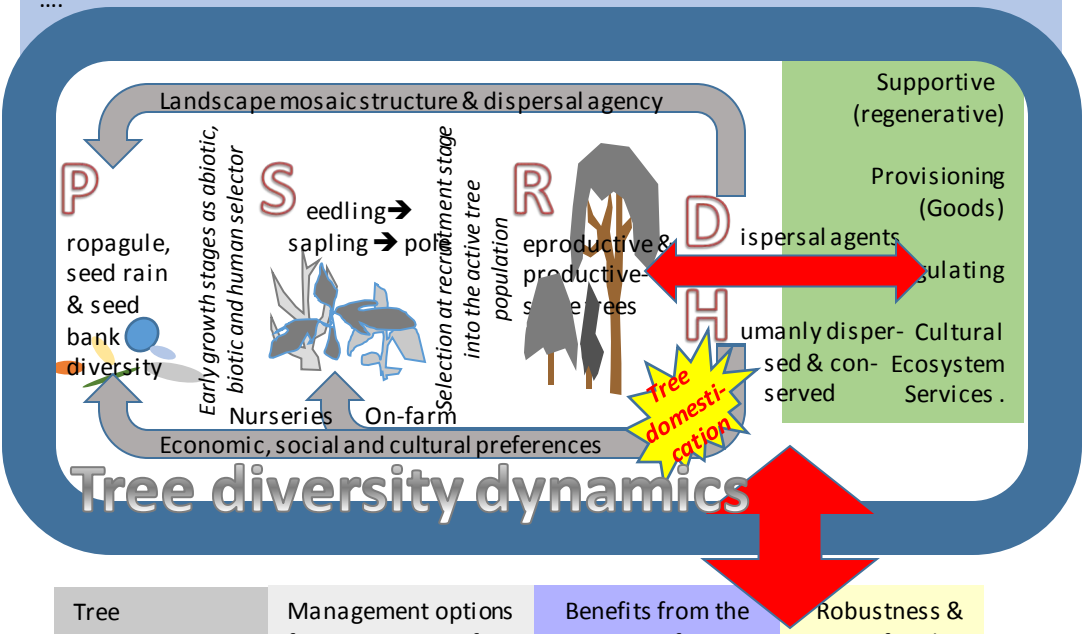
Complex agroforestry systems have been adjusted not only to local environments but also to local cultures and their specific norms of behaviour. A recent study at the World Agroforestry Centre of sugar palm agroforests in Batang Toru, North Sumatra, Indonesia, we took as a lesson in being cautious about thinking a rural landscape was simple and easy to improve.
From the study, it seemed that gender-specific roles in agroforestry systems were influenced by the local culture, with variable opportunities for change. This must also affect all of the bio-physical areas we typically examine because, of course, almost invariably it's people who implement any change to them.
Tapping the sugar palm was a task for men because it involved the physically taxing and risky business of climbing trees to tap the sap, for which women's physique and ...

Read further

- Sugar palm (Arenga pinnata (Wurmb) Merr.) for livelihoods and biodiversity conservation in the orangutan habitat of Batang Toru, North Sumatra, Indonesia: mixed prospects for domestication. Agroforestry Systems 86:401—417.

AF1 Tree diversity transitions

Variability, fluctuations and trends in climatic variables, pest & disease pressures, market demand & prices, consumer quality criteria, forest and land access policies, labour availability … ….



Tree domestication and pool of repro-ducable tree germ-plasm	Management options for compositon of the local tree portfolio & its diversity	Benefits from the specific components of the local tree portfolio	Robustness & antifragility benefits of the diversity as such

How do you like your rubber?

By Meine van Noordwijk, Hesti L. Tata, Sonya Dewi and Peter Minang 10/18/2012

Rubber's history in China and Indonesia points to a monocultural future. Is it too late to promote 'green' rubber?

In China, rubber was introduced as a top–down, state-driven policy of monoculture plantations, the effects of which have been studied by our colleagues at the World Agroforestry Centre's East Asia Node, amongst others. In stark contrast to the situation in China, in Sumatra in Indonesia, rubber was positively integrated into smallholdings at the start of the 20th century. Rubber agroforests in Indonesia over time became an icon of environmentally friendly integration, while in China the tree has become associated with destruction of ecosystem services and reduction of biodiversity.

The situation in Xishuangbanna, China, has triggered public debate and a rethinking of the monocultural model of intensification that dramatically segregates various types of land uses within a landscape. Meanwhile, the old Indonesian agroforests are giving way to monocultural tree crop plantations after almost a century. The efforts to keep appreciable amounts of the old rubber agroforests in the Sumatran landscape are 'rowing against the tide' and the growth of local and foreign appreciation for the biodiversity contained in these agroforests may well come too late to retain more than a small fraction in the least accessible places.

By the time the overall economic level and wage rates of Sumatra catch up with the current levels in peninsular Malaysia, smallholding rubber farms will have a lower return to labour than urban and service sector jobs and there may still be a small basis for recovery of diverse agroforests.

However, in China, the monoculture rubber plantations may have lower opportunity for ecological recovery because they don't contain saplings or young trees of natural forest species and seed dispersal agents such as bats and birds may have disappeared.

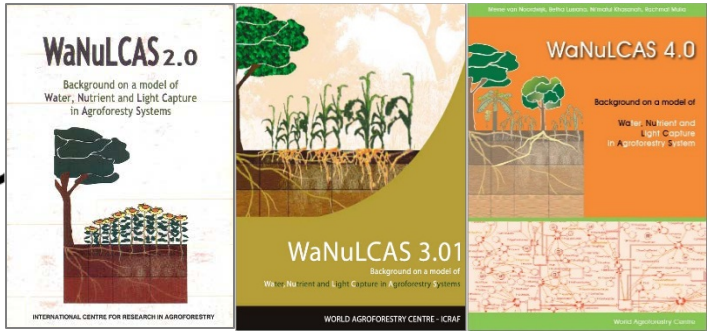
Integrate or segregate?

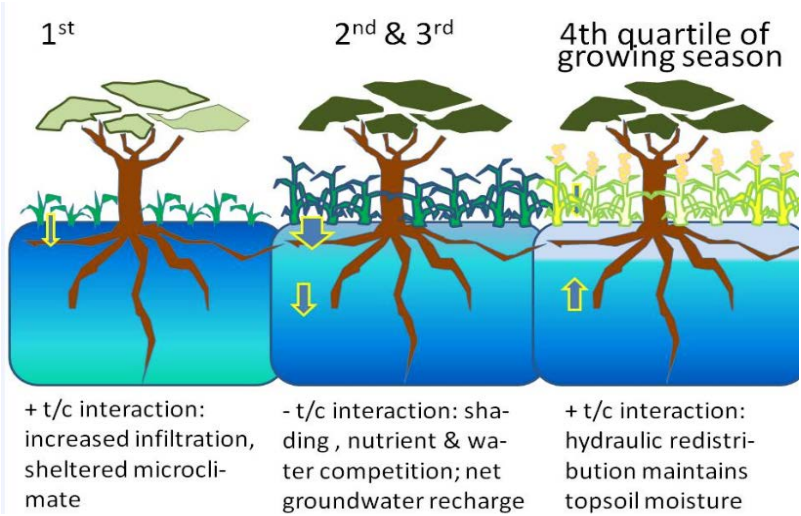
In both countries a mixed model that sees landscapes of segregation (fully protected areas and areas of intensive agriculture) and landscapes of integration (pursuing ecologically more friendly intensification models using agroforestry) may be the best way to support local livelihoods as well as conserving the environment and ensuring it continues to provide the services we need.

Read further

- Segregate or integrate for multifunctionality and sustained change through landscape agroforestry involving rubber in Indonesia and China. In: Agroforestry: the future of global land use . Dordrecht, The Netherlands: Springer Science and Business Media. p. 69–104

AF1





Don't believe (3x)
the models you'll see
unless your data agree.

Don't believe (3x)
your data again
unless your models explain.

However,
Suspicion will be on you,
If agreement is too good
to be true

Does erosion represent landscape-level loss or gain of carbon stocks?

By *Meine van Noordwijk* 11/12/2012

The rice fields of Southeast Asia would be a lot less fertile without historical erosion of the associated hill slopes – does this mean that erosion can be carbon neutral?

In 1994 at the first big tropical soil carbon meeting after the Rio 1992 Convention spiked interest in the emission effect of all types of land use change, I shocked many in the audience by challenging the perceived wisdom that erosion was a major source of emissions (van Noordwijk *et al.*, 1997). True, erosion does lead to lower soil-carbon stocks on the eroding slopes, but we need to know what happens with the carbon-rich material that travels through the landscape. It might, for instance, get buried in a place where decomposition is slower than in the soil profile from where it came.

The idea that erosion might be a carbon-storage scenario, paralleled by burning of forests and associated charcoal accumulation in soils, was "politically incorrect", and in the desire to identify win-win solutions for local and global benefits, the idea got buried.

Still, the second Intergovernmental Panel on Climate Change (IPCC) report in 1 995, in its chapter on soils of which I was co-author, reported that the jury was out on net gain or loss from erosion at landscape scale, and that further research was needed (Paustian *et al.* , 1997).

Ignoring the challenge, however, the idea crept back into the literature that erosion was a bad thing not only for on-site productivity but also as cause of global C emissions.

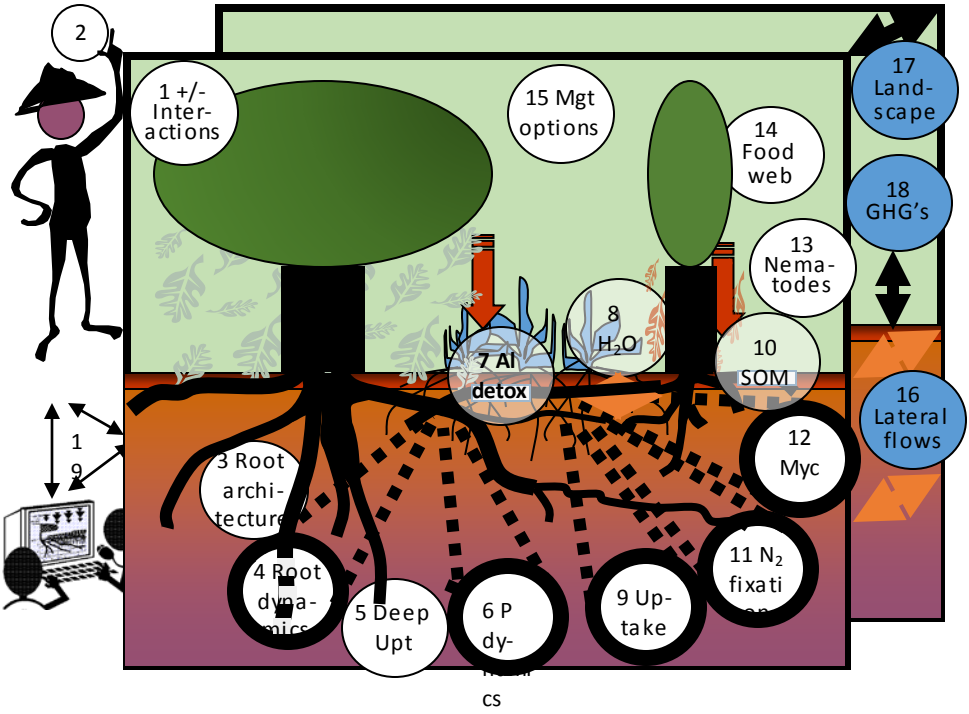
In a new paper titled 'Legacy of human-induced C erosion and burial on soil–atmosphere C exchange' in the *Proceedings of the National Academy of Sciences*, van Oost and co-authors from Leuven University now report that for a landscape (the Dijle catchment) in Belgium, a long-term C sink in colluvial sites had stored the equivalent of 43% of the eroded C, and that this sink had offset 39% (1 7–66%) of the C emissions due to anthropogenic land-cover change since the advent of agriculture in the area.

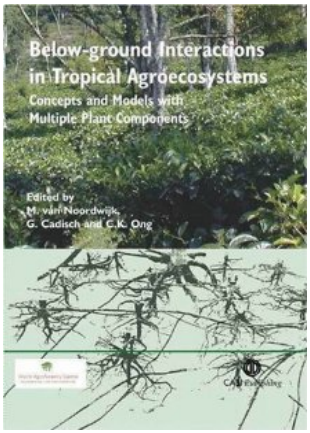
Of course this does not mean that stimulating erosion is a good idea,

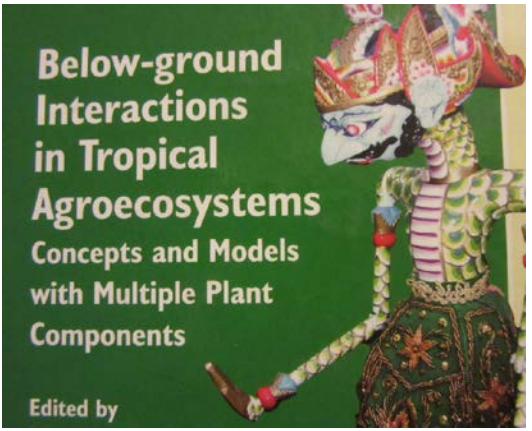
Read further

- Agricultural soils as a sink to mitigate CO2 emissions. Soil Use and Management 13: 230-244.
- Spatial variability of soil pH and phosphorus in relation to soil run-off following slash-and-burn land clearing in Sumatra, Indonesia. Soil Tillage Research 71: 1-14.
- Soil carbon in the humid tropical forest zone. Geoderma 79: 187-225.
- Erosion and sedimentation as multiscale, fractal processes: implications for models, experiments and the real world. In: Soil Erosion at Multiple Scales, Principles and Methods for Assessing Causes and Impacts.
- Factors affecting soil loss at plot scale and sediment yield at catchment scale in a tropical volcanic agroforestry landscape, Catena 80: 34-46.

AF1 Belowground interactions



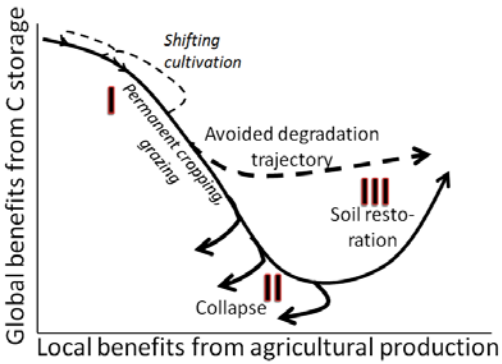




The soil-carbon transition curve as near-death experience

By Rob Finlayson 3/27/2013

"The carbon content of soils is improving in parts of East and Southeast Asia, while the public discourse is mostly about soil and land health degradation. This is similar to the pattern of tree cover or forest transition and the processes are indeed linked. The CGIAR Research Program on Forests, Trees and Agroforestry is built on the forest transition concept and we now have its belowground counterpart", says Meine van Noordwijk



The Scientific Committee on Pro-blems of the Environment (SCOPE), which, since 1969, has been a forum where scientists can interact with the interests of policy makers and others, is now preparing to publish its 73rd volume, building on a topic identified in a chapter in the *UNEP yearbook 2012: emerging issues in our global environment*, that is, the benefits of soil carbon . SCOPE's volume will consists of 27 background chapters, which are in the final stage of peer review and editing for release before the end of 2013….

Read further

Tree–crop interactions: agroforestry in a changing climate

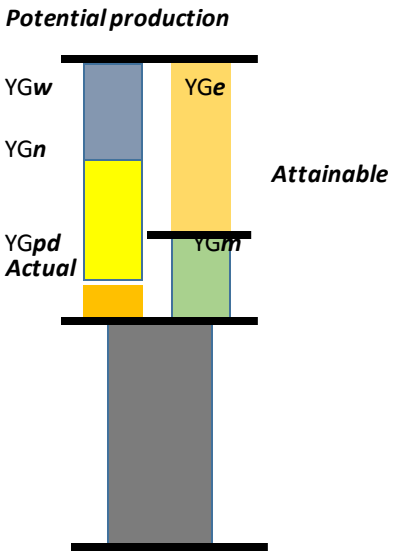
By Meine van Noordwijk 1/7/2016

Twenty years after the first edition of the standard book on tree–crop interactions, edited by Peter Huxley and Chin Ong, we now have a second edition. The second edition has explicit attention to climate change, with chapters on microclimate effects and consequences for the various terms of the water balance.
The primary strength of the book remains the focus on a process-level understanding and. As such, on results beyond the location-specific empirical selection of best practices in a given context. The various chapters help in reasoning how changing conditions may have to be accompanied by changing practices, based on what we know of the balance between competition and complementarity. Apart from a chapter on water and two on roots, the focus remains on aboveground interactions; a volume with deeper analysis of belowground interactions had been published ten years ago. Research traditions in agroforestry keep oscillating between direct empirical work on 'options in context' and efforts to build more…

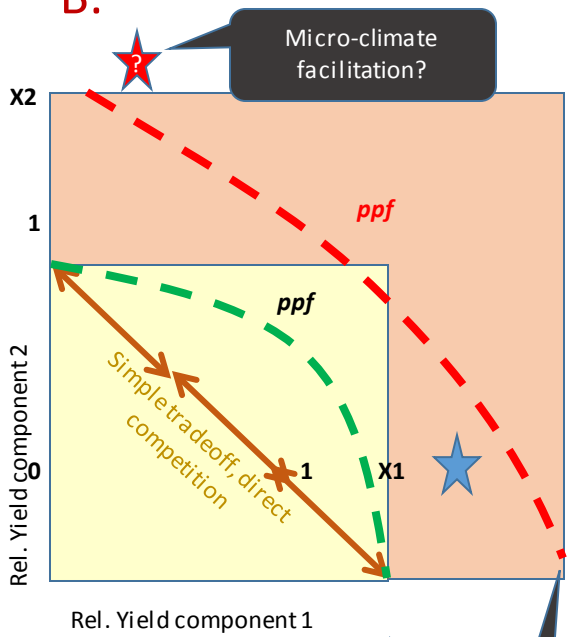
Read further

AF1 Yield gaps & land equivalence ratio

A.



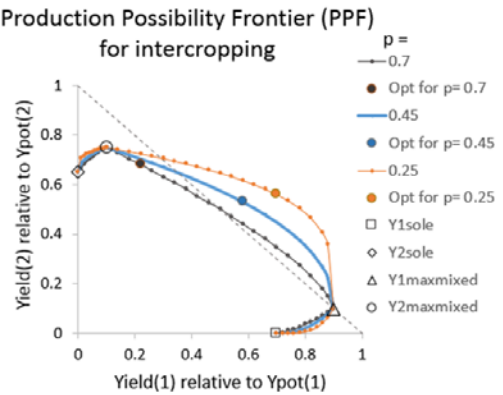
B.



Scaled by 'attainable' sole crop yield

Potential sole crop yield

YG = yield gap:
YG***w*** = water-limited
YG***n*** = nutrient-limited
YG***pd*** = pest & disease-limited
YG***e*** = economically constrained
YG***m***= management constrained



One tree, many trunks: agroforestry and the Sustainable Development Goals

By Rob Finlayson 2/26/2016

The new global agenda has one goal: a sustainable Earth. The contribution of agroforestry in achieving this was discussed in detail at Asia-Pacific Forestry Week, led by Dr Meine van Noordwijk, presented here in part 1. See part 2 for responses.

'All the Sustainable Development Goals are interconnected; we can't achieve one without the others', stated Dr Meine van Noordwijk, chief science advisor with the World Agroforestry Centre (ICRAF). Dr van Noordwijk was the keynote speaker at a session on agroforestry and the goals held at Asia-Pacific Forestry Week, 22–26 February 201 6, in Clark, Philippines as part of the contribution from the ASEAN-Swiss Partnership on Social Forestry and Climate Change phase 2 project.

'And to do this, we need to combine knowledge systems: local/indigenous, public/ policy, and science-based We need to understand how knowledge is created in each of these arenas and how to use these experiences to change the trajectory our world has been on'.

Read further and for part 2

To share or spare land? A 25-year debate

By Rob Finlayson 10/19/2012

The Centre's chief science advisor reflects on 25 years of research and debate

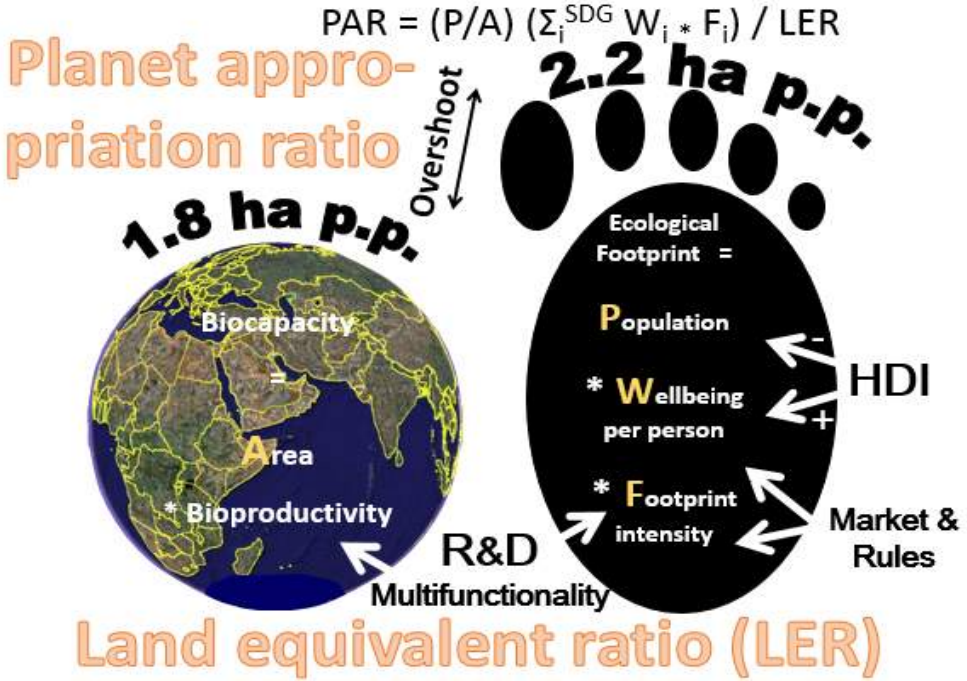
On 1 3 October 1 987, the PhD thesis, 'Roots, plant production and nutrient use efficiency', was defended in two separate exams at Wageningen University in the Netherlands.

The thesis had been written jointly by Peter de Willigen and myself. Both of us had to defend a number of chapters, as well as the overall introduction and discussion. Such a joint thesis was possible under the Dutch academic rules, although these rules were rarely applied.

Twenty-five years after that date, Google Scholar showed 249 citations of the thesis, about 10 per year, which is better than the 'impact factors' of the best journals in agronomy and soil science.

At the time of the PhD exam, the hottest issue was directly derived from the title: are plant production and resource use efficiency essentially independent properties (production can be low, intermediate or high in combination with any level of efficiency) or is efficiency essentially positively correlated with production levels? Our promotor, Prof CT De Wit, an influential member of the CGIAR Science Council, had argued the latter whereas we defended the former.

Read further


PAR = (P/A) (Σ_i^{SDG} $W_i * F_i$) / LER
Planet appro-priation ratio
Overshoot
2.2 ha p.p.
1.8 ha p.p.
Biocapacity
=
Area
* Bioproductivity
Ecological Footprint =
Population
* Wellbeing per person
* Footprint intensity
HDI
Market & Rules
R&D
Multifunctionality
Land equivalent ratio (LER)

The carbon footprint of oil palm in Indonesia

By Ni'matul Khasanah, Meine van Noordwijk, Andree Ekadinata, Sonya Dewi, Subekti Rahayu, Harti Ningsih, Anang Setiawan, Elisa Dwiyanti and Rahayu Octaviani.

The European Union plans to limit the conversion of land globally for biofuel production. Such conversions will be included when estimating greenhouse gas emissions from biofuels. The World Agroforestry Centre had earlier assessed the carbon footprint of oil palm in Indonesia and made similar recommendations.

The European Commission published a proposal on 1 7 October 201 2 to limit global land conversion for biofuel production. The proposal limits to 5% the use of food-based biofuels—such as oil palm—to meet the targets of the Renewable Energy Directive. Whatsmore, the estimated impact of global land conversion on greenhouse gas emissions from biofuel production will be taken into account. The Renewable Energy Directive of the European Union includes a commitment to substitute part of the Union's transport fuel with biofuels in order to reduce carbon dioxide emissions.

The Directive defines minimum net emissions reductions and implies that palm oil-exporting countries, such as Indonesia, need to have reliable data on the carbon footprint of palm oil that is intended to be used as biofuel. To gather such data, we applied the Biofuel Emissions Reduction Estimator Scheme to 23 oil palm plantations in Indonesia. These plantations all abided by what was considered 'good practice'.

What we found

Part of our findings was that ten of the 23 plantations had converted more than 60% of their area from forests to oil palm. Another ten plantations had a slightly lower forest-to-oil palm conversion rate, which ranged1 0–20% of the total conversion area in the plantation. Only three of the 23 plantations were converted from purely non-forest areas.

A plantation which has converted a large proportion of its area from forest to oil palm will have higher emissions compared to a plantation that converted from tree-based, non-tree-based or non-vegetation land uses.

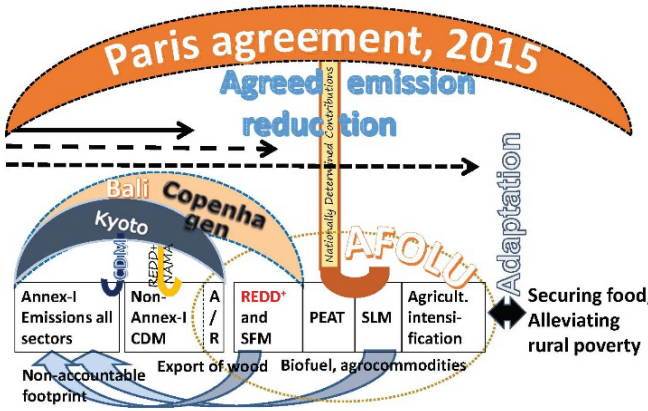
We also found that oil palm averages 40 tonne of carbon per hectare. To come to this figure, we analyzed the amount of carbon stored in oil palm aboveground, over time, in different production environments (such as on peat and mineral soils) and management regimes, including large plantations and smallholdings.

Read further

Partnership for the Tropical Forest Margins

Policybrief 53

Minimizing the footprint of our food by reducing emissions from all land uses



It took twenty-four years after the formulation of the UN Framework Convention on Climate Change (UNFCCC), but by November 2016 the Paris Agreement will come into force and finally provide an umbrella for addressing fossil fuel as well as land-use aspects of the human impact on the global climate. Its preamble (as well as article 2) emphasizes the primary concern over continued food production. Will accounting systems and accountability further shift towards 'footprints' per unit product, aligned with emission accounting from all land uses, not 'just' forests?

Bad news for international bio-energy regulators

blog.worldagroforestry.org/index.php/2013/01/15/bad-news-for-international-bio-energy-regulators/

By Rob Finlayson 1 /1 5/201 3

A team of scientists has found that bio-energy crops such as oil palm can 'swing' the balance of their greenhouse-gas emissions depending on how the crop is managed. International regulators concerned with reducing emissions will have to look to the managers if they want to achieve their goals

The greenhouse-gas balance of bio-energy can swing from positive to negative or vice versa depending on key management decisions such as what the land was used for before the crop was planted, how the crop is harvested, when it is harvested and the way it is fertilized. 'We found that the largest "swing potential" was with oil palm: it all depends on where and how it is grown', said Dr Sarah Davis, leader of the team of researchers from eight different institutions.

'This in itself is a major challenge for the regulators of bio-energy. It would be much easier for them if the products of oil palm could be used as indicators of the environmental consequences of the crop.

However, it doesn't seem to be that easy. They will have to take into account human decisions and practices in the crop's management'. These high-yielding bio-energy crops such as corn or maize, sugarcane, *Miscanthus* grass and fast-growing tree species can be managed for greenhousegas benefits or losses, suggesting that the bio-energy sector should incorporate evaluation of management techniques into classifications of bio-energy feedstock.

'The environmentally best and worst palm oil look the same', added Dr Meine van Noordwijk, one of the researchers. 'The "swing potential" thus contains both good news—the same product can be obtained from cleaner modes of production—and bad (for regulators): rules need to allow differentiation according to origin and some form of certification of production conditions'.

Bio-energy crops are often classified, and subsequently regulated, according to species that have been evaluated as environmentally beneficial or detrimental but the researchers have shown that, in practice, management decisions rather than species *per se* can determine the overall environmental impact of a bio-energy production system. However, while the management swing potential is substantial for many cropping systems, there are some species, such as soybean, that have such low bio-energy yield potential that the environmental impact is unlikely to be reversed by management.

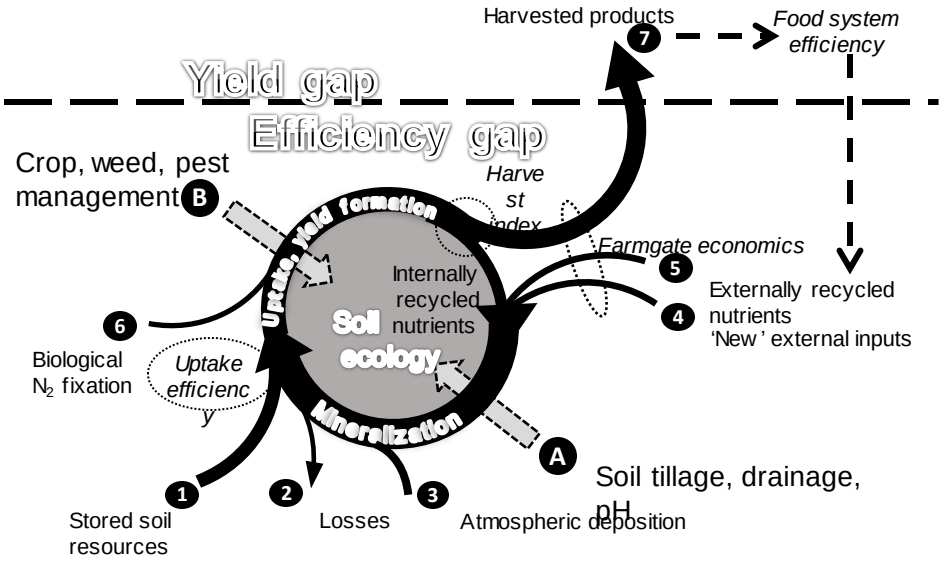
In their study, the researchers reviewed seven different bio-energy cropping systems in temperate and tropical regions. Bio-energy regulators and managers would be well advised to read the study closely.

However, forests and agroforests, which provide the richest variety of habitats, are endangered owing to conversion to monocultural systems, either annual crops or plantations. By implication, monocultural landscapes might not be able to provide the diversity of habitats required to support a diversity of bat species, which might threaten not only the viability of the plantations themselves under conditions of a changing climate but also the wider environment and the services it provides.

Our recently published book, *Jenis-jenis kelelawar khas agroforest Sumatera* ('Bat types specific to the agroforests of Sumatra'), is an identification guide to the bats of two provinces of the island, based on our study. Not only does it provide detailed photographs and descriptions of the species but it also provides background to their favoured habitats and their habits, their rarity status, and a description of the methodology we used.

Read further

❑ 2013. Management swing potential for bio-energy crops. Global Change Biology Bioenergy


Harvested products
7
Food system efficiency
Yield gap
Efficiency gap
Crop, weed, pest management
B
Harvest index
Uptake
Yield formation
Internally recycled nutrients
Soil ecology
Farmgate economics
5
4
Externally recycled nutrients
'New' external inputs
6
Biological N_2 fixation
Uptake efficiency
Mineralization
A
Soil tillage, drainage, pH
1
2
3
Stored soil resources
Losses
Atmospheric deposition

Biodiesel from palm oil: finding the sweet spot between ecology and economy

By Sander Van de Moortel 11 /30/2016

Oil-palm fruit ready for transport to a processor. Photo: World Agroforestry Centre/Robert Finlayson

Scientists at ICRAF The World Agroforestry Centre have struck the golden mean between intensification and environmental health for oil-palmplantations. Their analysis shows that sustainable systems can significantly boost production but not as high as some analysts believed.

Not many will disagree that once land has been brought into cultivation it is best managed in such a way that it is maximally productive. The best way to achieve higher efficiency without converting adjacent land or forest into plantations is intensification, the process of optimizing the ratio of input and output per unit of land. 'Especially in the case of oil palm in Indonesia, yield levels have been substantially below what is considered to be the potential', said Meine van Noordwijk, ICRAF's Chief Science Advisor.This has led many analysts to suggest that there is a win-win situation for economy and environment: higher yields per unit of land will increase the total output while taking away the need for plantation owners to expand into adjacent forests, thus, substantially reducing carbon emissions and maintaining biodiversity.
While that is true, intensification itself brings about a score of its own environmental problems: ground and surface water pollution, agrochemicals such as pesticides that may poison the wider landscape and, ironically, additional greenhouse-gas emissions from increased use of fertilizers. Indeed, nitrogen fertilizer emits substantial amounts of CO_2 in its production stage and when applied it releases an even stronger greenhouse gas, nitrogen dioxide (N_2O)...

Read further

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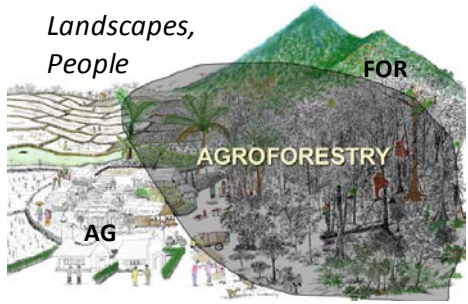
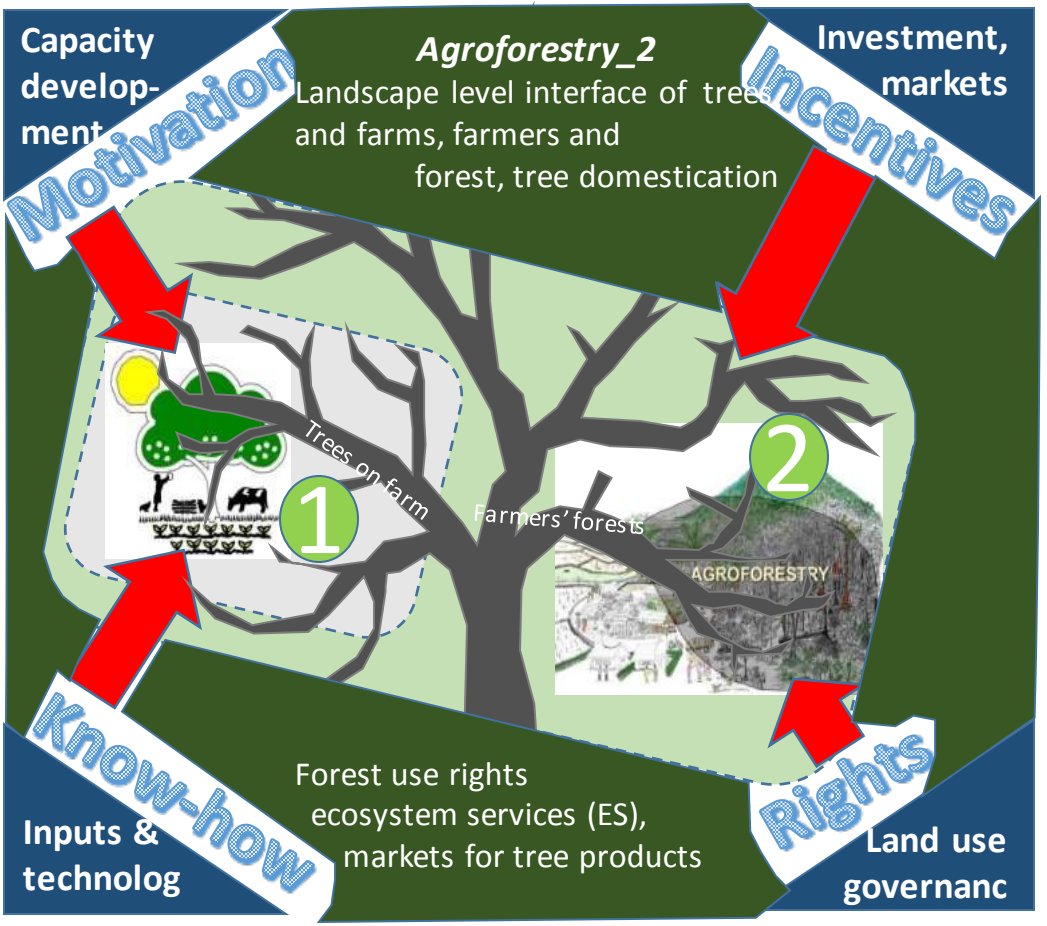
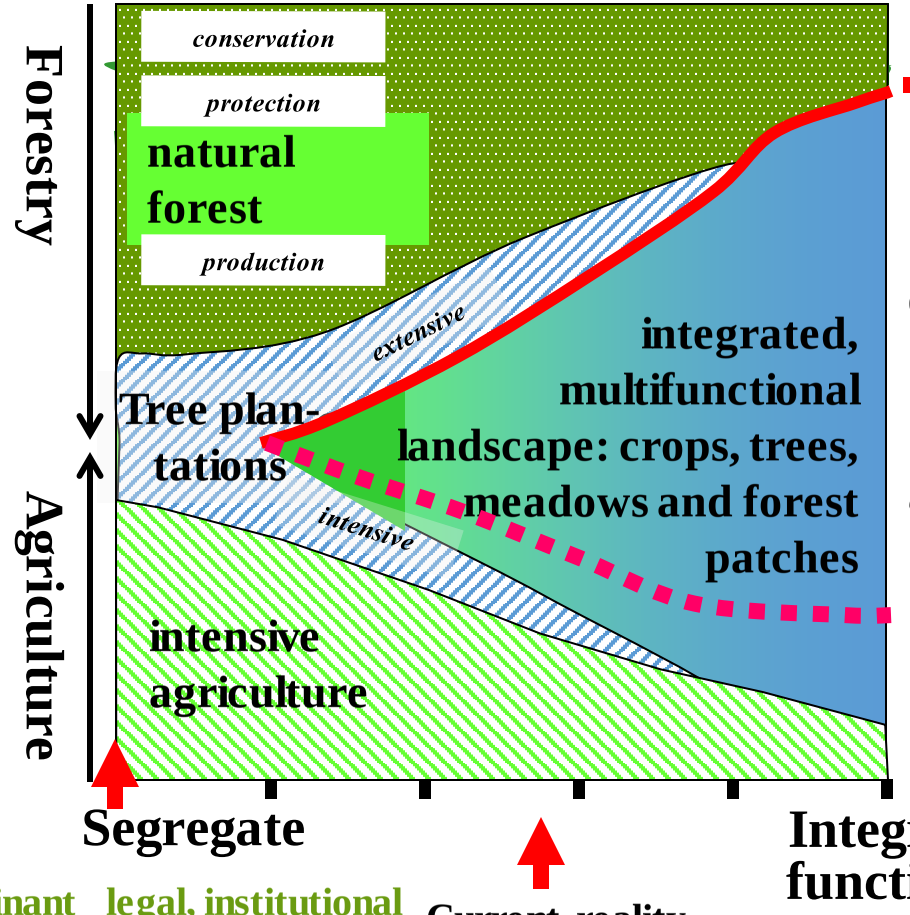


Section 2

Landscape agroforestry paradigm emerged in early 1990's, soon after ICRAF engaged in SE Asia.



AF2



Debates on 'deforestation' refer to 'loss of forest func-tions', a gradual concept, and/or loss of formal institutional control

With institutions segregated on A vs F, AF ideas maps a large part of reality, which is informal and not 'visible'

Structuring perceptions and simulating the reality of land-use changes in training in landscape governance

By Sacha Amaruzaman and Meine van Noordwijk 05/12/2016

Landscapes are many-splendoured things. A training course has set out to help people involved in their management better understand the complexities.

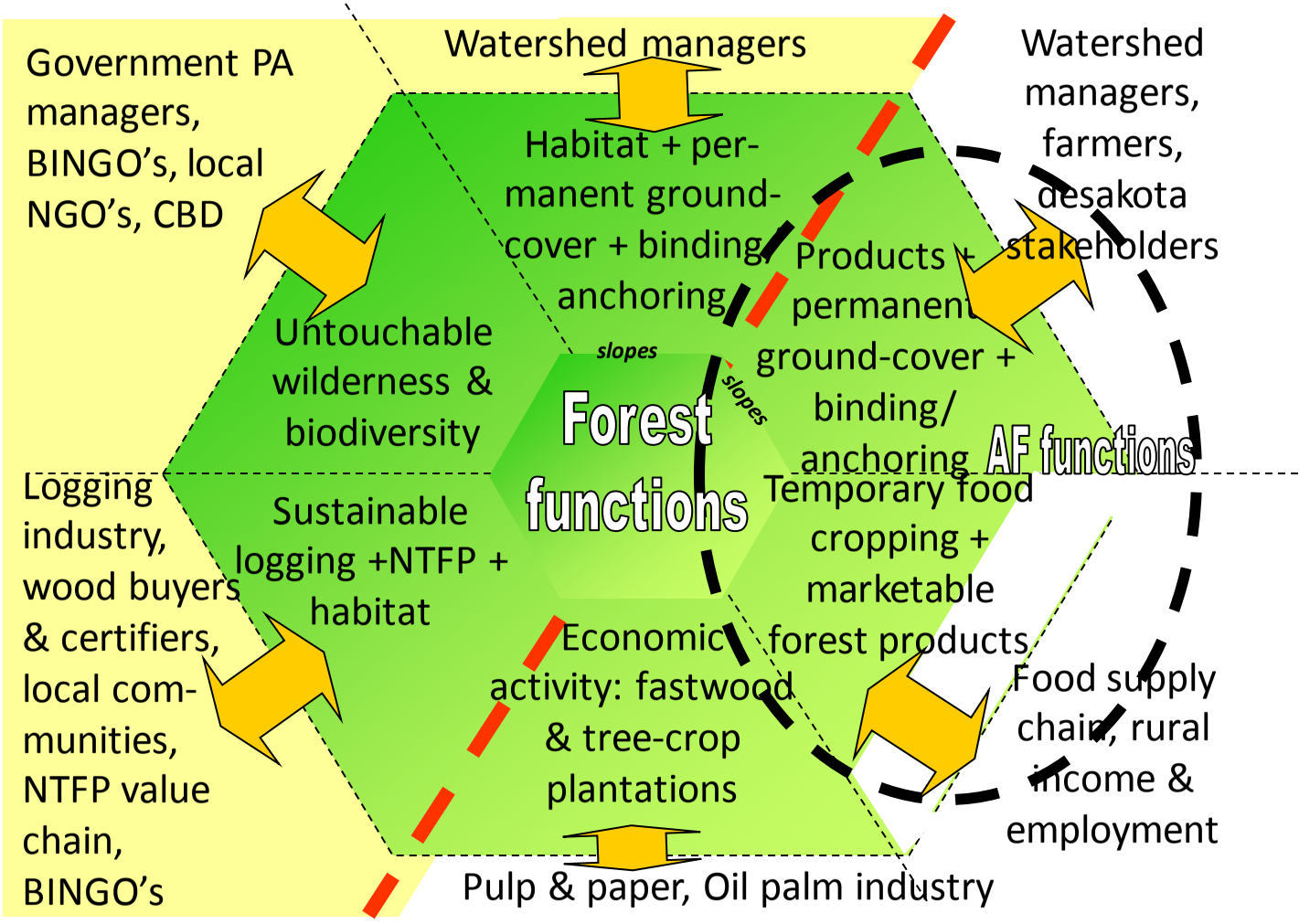
Forested landscapes are crucial in providing various ecosystem services to improve human well-being through food provision, biodiversity and agricultural commodities, among others. Within these landscapes, such services often compete for space. Any landscape mosaic is influenced by the differing agendas and interests of the people who reside within it as well as those from outside. Hence, one of the main challenges of managing landscapes is finding a synergy between the different interests through dialogue, negotiation and mediation.

To promote a better understanding of landscape governance, the CGIAR Research Program on Forests, Trees and Agroforestry—which is led by the Center for International Forestry Research in partnership with the World Agroforestry Centre (ICRAF) and others—and the Wageningen UR Centre for Development

Innovation in the Netherlands facilitated an international training course—Governance of Landscapes, Forests and People—in Bogor, Indonesia over two weeks in April 201 6. The course aimed to help participants adopt an integrative, cross-sectoral and multidisciplinary approach in order to mediate different interests and facilitate negotiations to sustainably manage landscapes. Thirty people joined the course, hailing from Asia, Europe, Africa and South America with backgrounds in government, non-governmental organizations and academe.

During the training, ICRAF lead the facilitation of two sessions: Q-methodology; and Land-use Game. In the Q-methodology session, ICRAF ran an exercise to reveal the perceptions of the participants of the definition of landscape governance. Using Q-methodology, which is a qualitative research method to structure different points of view, the participants were asked to sort their subjective opinions about landscape governance. The first step was generating statements that were compiled from the participants' sharing session on the first day. A total of 32 statements were used for Q-sorting, the second step. This involved the participants sorting the statements into a Q-sort matrix. At the end of the course, the results were distributed to all participants to give them an idea of the common perspectives of the group

Read further


Government PA managers, BINGO's, local NGO's, CBD
Watershed managers
Watershed managers, farmers, desakota stakeholders
Habitat + per-manent ground-cover + binding/ anchoring
Products + permanent ground-cover + binding/ anchoring
Untouchable wilderness & biodiversity
slopes
slopes
Forest functions
AF functions
Logging industry, wood buyers & certifiers, local com-munities, NTFP value chain, BINGO's
Sustainable logging +NTFP + habitat
Temporary food cropping + marketable forest products
Economic activity: fastwood & tree-crop plantations
Food supply chain, rural income & employment
Pulp & paper, Oil palm industry

A world with trees but without the word forest – a thought experiment

By Meine van Noordwijk 5/9/2017

The recent paper "China's fight to halt tree cover loss" carefully avoided the word 'forest' in its title. It challenged the various definitions of forest that may cause more confusion than necessary, and preferred the more objectively observable 'tree cover' term for discussing what types of changes are occurring in China and whether or not the investments made by the state are delivering the services society wants.

This leads to a thought experiment – please give it a try for the next five minutes: can we do without the word 'forest' and its derivatives (deforestation, reforestation, afforestation, agroforestry, agroforestation)?

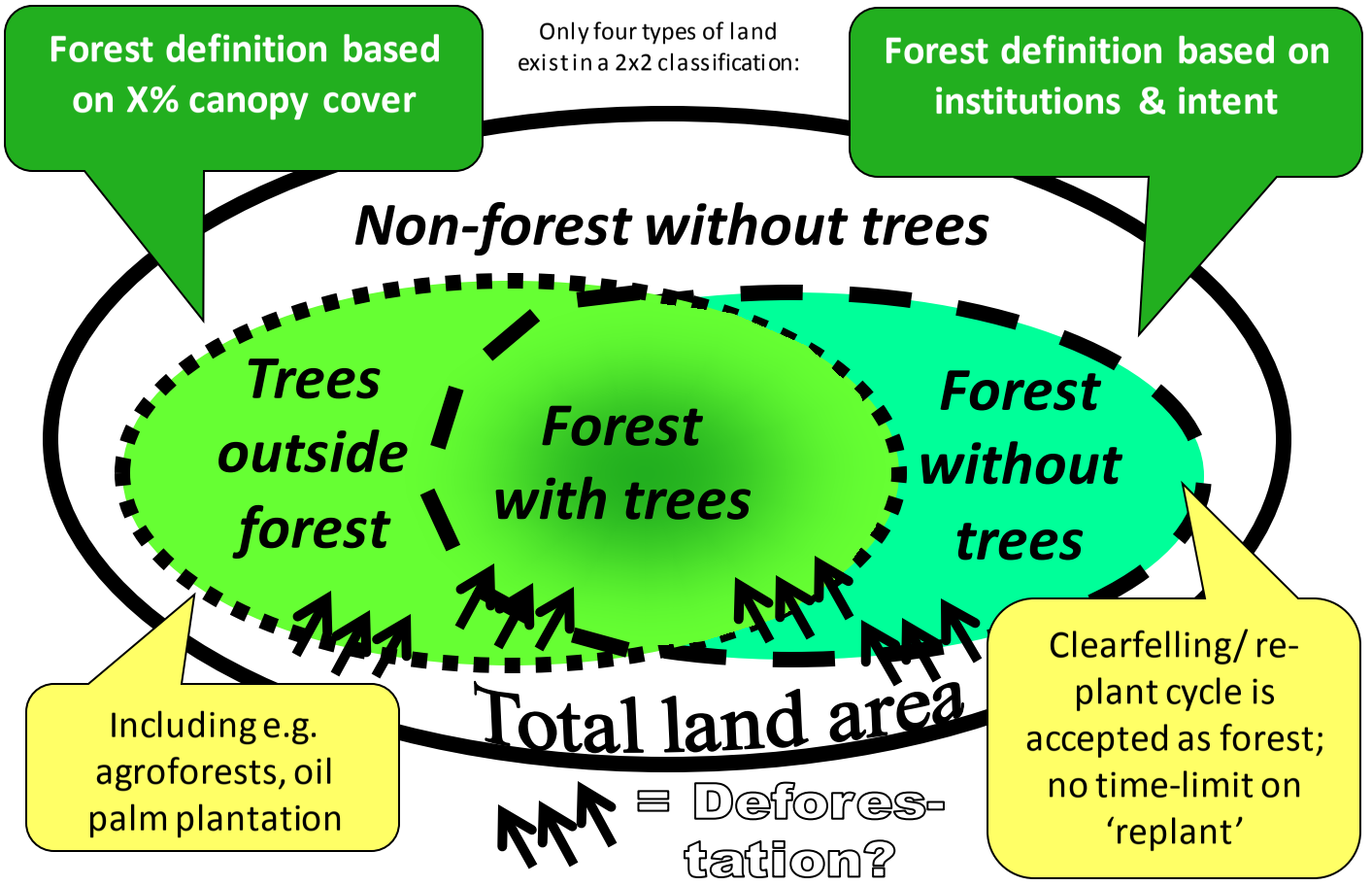
A landscape in Vietnam with small scale logging and various types of tree cover: is there forest in view?

Let's try:

No, not a world without trees, of course. It is hard to think of landscapes completely without perennial woody stemmed plants – although they may be short and sparse in harsh climates, belong to a wide range of plant families, including ferns, conifers, dicotyledons and grasses, restricted to the edges of fields, lining roads, isolated remnants of a formerly denser vegetation retained to provide shade, or planted to create a more pleasant environment around houses and in urban areas.

No, not a world without "old growth", "young growth", "jungle rubber", "home gardens", "timber plantation", "tree crops", "line plantings" and vegetation derived from "old growth" by various degrees of logging and currently recovering….

Read further


Forest definition based on X% canopy cover
Only four types of land exist in a 2x2 classification:
Forest definition based on institutions & intent
Non-forest without trees
Trees outside forest
Forest with trees
Forest without trees
Including e.g. agroforests, oil palm plantation
Total land area
= Defores-tation?
Clearfelling/ re-plant cycle is accepted as forest; no time-limit on 'replant'

TIF, TOF and TOTOF trees or universal tree rights?

By Rob Finlayson 4/8/2013

Technical definitions of 'forest' and 'agriculture' have severely hampered efforts to protect forests, reduce carbon emissions and enhance food security. It's time to think beyond these categories, says Meine van Noordwijk

Forest? Agriculture? Agroforest? Photo: ICRAF/Eva Sharpe Finlayson

Anecdote has it that colonial foresters in Indonesia used a simple criterion in identifying forests that could be proposed for the national forest reserve: if you heard a rooster crowing in the morning you were too close to a village, which meant that where you were standing was still agricultural land, regardless of the tree cover. It was a reflection of the power relations of the time that agriculture prevailed over forest (only later did the army back up the economic interests involved in forest concessions).

In fact, a similar rule became enshrined in the forest resource statistics of the Food and Agriculture Organization (FAO): *regard-less of tree cover*, if land is *considered* to be 'agricultural' or 'urban' it cannot be 'forest'. Deforestation became quantified as the loss of this type of 'forest', which in essence actually indicated the handover of control by forest institutions to others. Contrary to popular belief, deforestation did not necessarily imply an immediate change in tree cover nor did the management of forests by forest institutions—or the private companies to which they sold logging rights—imply that the forest kept its tree cover.

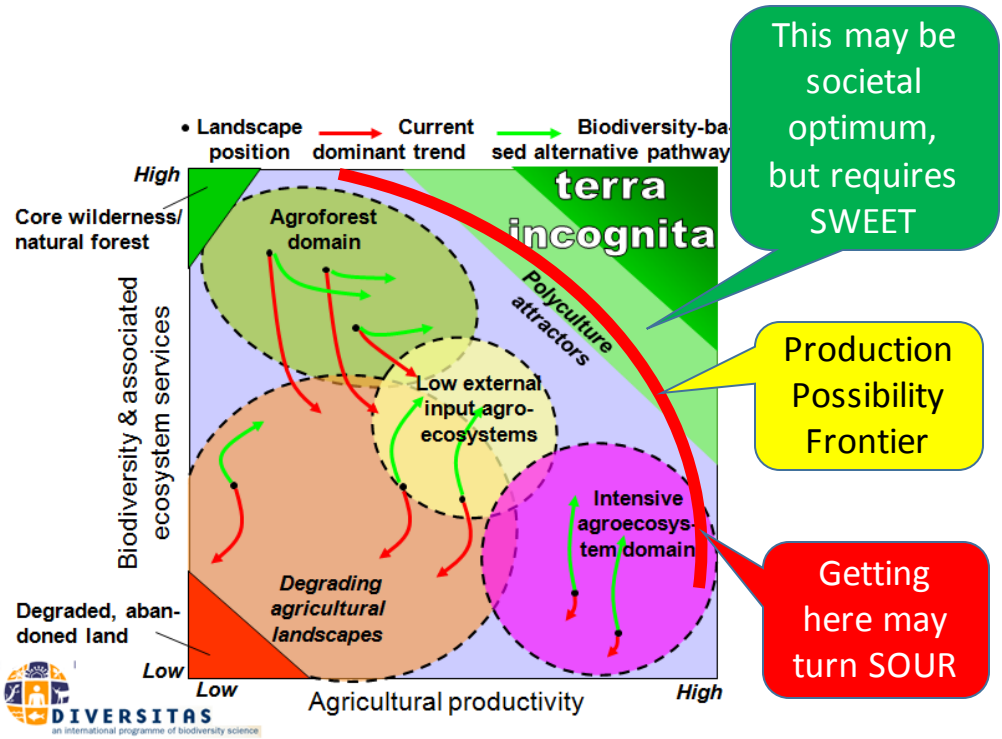
Being 'temporarily unstocked but with the intention of tree regrowth' was sufficient in the definitions foresters agreed to use1. These definitions led to some strange consequences, for example, rubber (*Hevea brasiliensis*) plantations were classified as 'forest' if managed by foresters for timber (rubberwood) production but the same trees would be 'agriculture' if grown for latex or latex plus wood.

So, if the definitions were taken to court and scrutinized by lawyers they would see that it was the intention of the planter that mattered rather than the actual condition of the land and trees: one rubber tree was a TIF (Tree Inside Forest) while the other was a TOF (Tree Outside Forest). This 'TIF versus TOF' mattered very little until forest institutions discovered the public interest in environmental issues such as biodiversity and carbon stock.

Forest institutions then saw a chance to renew their political status and economic prospects by defining applicable 'forest' policies and become eligible for more public funding (or private funding to meet public emissions-reduction commitments).

However, the TOF, their owners and other stakeholders were left outside of the deal. Forestry institutions became the gatekeepers of afforestation/reforestation rules under the Clean Development Mechanism (A/R-CDM) and the efforts to Reduce Emissions from Deforestation and forest Degradation (REDD+).

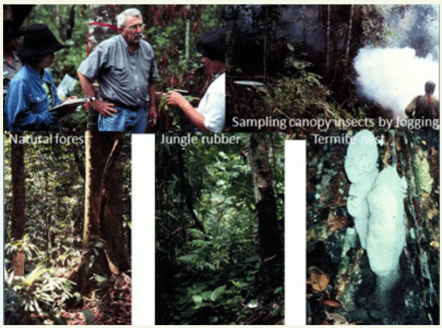
Read further



Sustainable Weighting of Economy-Ecology Tradeoffs: Organized Reduction or Stretching Our Use of Resources? (SWEETorSOUR?)

biodiversity, trees, Amazon

TREES AND BIODIVERSITY: INTEGRATED SURVEYS OF BIRDS, BEETLES, BATS, BEES, BUTTERFLIES AND BEASTS IN TROPICAL RAINFOREST



By Meine van Noordwijk

Biodiversity encompasses all forms of life, and it is thus nearly impossible to measure. Most of the time we have to rely on "proxies", or correlates, such as the presence of trees – with the expectation that the larger and more diverse the trees are, the higher the diversity of other forms of life will be. Natural rain forest is the most diverse ecosystem on land, only rivaled by its marine counterpart in the coral reef.

Once in a while, however, scientists get a chance to test these assumptions on correlations and proxies, by sampling many groups of organisms at the same location. A recent paper[1] discusses "Plant functional types and traits as biodiversity indicators for tropical forests: two biogeographically separated case studies including birds, mammals and termites." It draws on the results of an integrated sampling effort in two of the worlds' biodiversity hotspots: the Brasilian Amazon and

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Bat diversity in a healthy landscape

Bats are indicators of the health of an ecosystem. A new book by Pandam Nugroho Prasetyo, Sephy Noerfahmy and Hesti Lestari Tata helps characterise their diversity.

Of the more than 1 000 species of bat in the world, Indonesia has 1 75 (about ten times the number of species found in the UK), of which 68 occur in Sumatra. Of these, 46 species are found in the provinces of North Sumatra and Jambi where we carried out a study from 2005 to 2011. We found that the bats of these two provinces lived in primary and secondary forests, monocultural and mixed rubber plantations and agroforests, though not all species occurred in each environment. Interestingly, some species were more common in agroforests than primary or secondary forests and some did not appear in the latter at all.

The presence of bats in such varied habitats suggests that a landscape made up of 'habitat mosaics' can help preserve the diversity of species. Different types of bats play different roles in the ecosystem: some pollinate flowers, including those of important fruit trees such as durian and petai; others eat fruits and in ...

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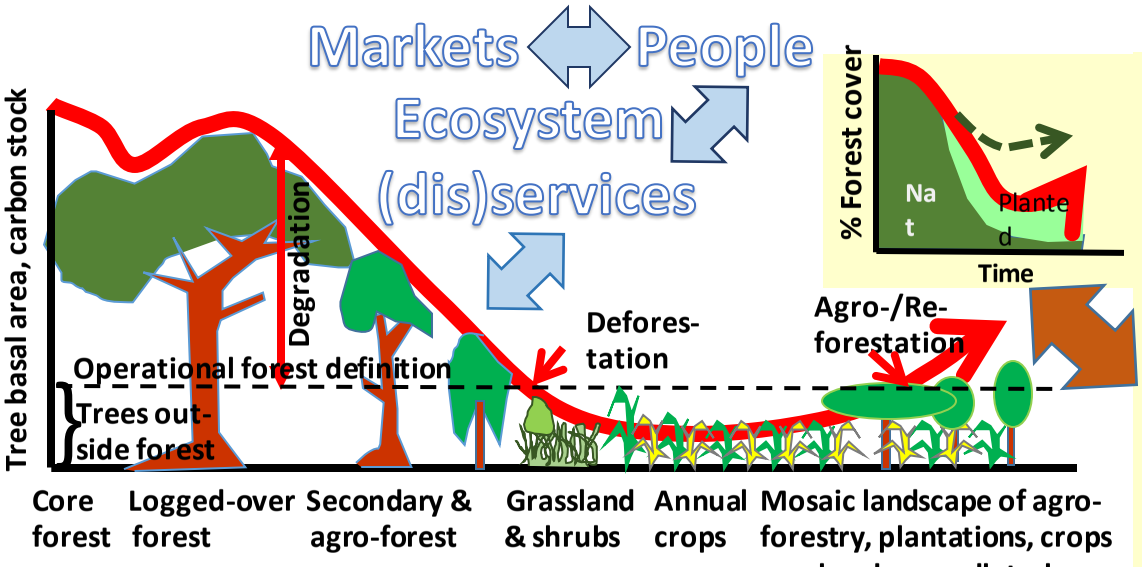
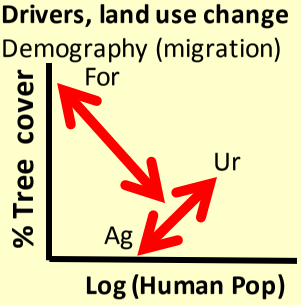
A. Theory of Place



B. Theory of change (drivers)



Logging, forest management (For)
Agricultural (Ag) expansion
Plantation development
Agricultural de/re-treeing
Agroforestation
(Peri)urban (Ur) re-treeing

C. Theory of induced change

Inter-ventions

Changes of awareness, monitoring, analysis of options and scenarios
Changes of land (use) rights, regulations of conversion, agricultural & urban planning
Changes in economic incentives, market demand, profitability, taxation, certification

Actors

On the threshold of a national forest transition: can trees on farm help the Philippines?

By Rebecca Selvarajah 5/1 6/2013

Programs to support tree planting on-farm are more likely to succeed in areas that are already deforested or where remaining forests are effectively protected, and where farmers have secure land tenure, say Fernando Santos Martin and colleagues in a policy brief published by the ASB Partnership for the Tropical Forest Margins and the World Agroforestry Centre. They further say that to support tree planting, governments should focus on enabling conditions, rather than providing tree seedlings.

As long as natural forests can be accessed for timber, farmers have little incentive to grow trees on their own land. National tree planting programs in the Philippines have achieved early successes with fast growing trees. However, the quality of wood was low, earning the farmers disappointingly little income. Some farmers responded by growing high-value, slower-growing native timbers, intercropping trees with maize. What are the prospects for this? What influences smallholders to plant native timber trees? Which types of farmers are doing it? Is it profitable? What policy measures could support or enhance such agroforestation of the landscape? A recent study by the ASB Partnership for the Tropical Forest Margins and the World Agroforestry Centre looked at several of these questions at the island of Leyte in the Philippines. Boosting the productivity and sustainability of forestry and agroforestry, and improving policies and institutions that affect these are a key focus of the CGIAR's Collaborative Research Project 6 on Trees, Forests and Agroforestry—of which the World Agroforestry Centre is a key partner.

Leyte province was selected as the study site because it was representative of upland environments that were intensively cultivated and heavily degraded, and in which farmers had started to plant native timber trees. The study found that agroforestation—planting trees on farms—in the Philippines has little chance of increasing tree cover while access to native forests provides timber resources. Where farmers had nrestricted access to nearby forests for timber, they saw no need to plant their own timber trees. The land controlled by the household—total area and number of parcels it was divided into—and tenure security are also key factors affecting farmers' decisions to plant native timber trees on their farms. This means reforestation programs are more likely to be successful in areas with secure land tenure that are already deforested (or have high potential for degradation). The study also showed a positive link between access to markets and tree-planting activities.

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What matters most?