Trees on farms: the missing link in carbon accounting

By Susan Onyango 7/20/2016

While tropical forests continued to decline, a remarkable change is happening: tree cover on agricultural land has increased across the globe, capturing nearly 0.75 Gigatonnes carbon dioxide every year. A new study titled Global Tree Cover and Biomass Carbon on Agricultural Land: The contribution of agroforestry to global and national carbon budgets provides insights into the patterns of this tremendous change at global, regional and national scales.

According to the International Panel on Climate Change (IPCC), agriculture and land-use change account for about 24% of the world's greenhouse gas emissions. Climate change will also have strong impacts on food security in the long-term. Therefore agriculture needs to reduce its climate footprint. But a recent study has shown that the potential to reduce greenhouse gas emissions from crop and livestock production is limited. At the same time, large forest areas, primarily in the tropics, are still being converted into agricultural land to feed the world's growing population. For these reasons, agricultural practices that can significantly reduce carbon emissions are in high demand.

Trees on agricultural lands – also known as agroforestry systems – have the potential to contribute to climate change mitigation while improving livelihoods and incomes and providing invaluable ecosystem services at the same time. The World Bank estimates that globally 1 .2 billion people depend on agroforestry farming systems, especially in developing countries. However, trees on agricultural lands are not considered in the greenhouse gas accounting framework of the IPCC.

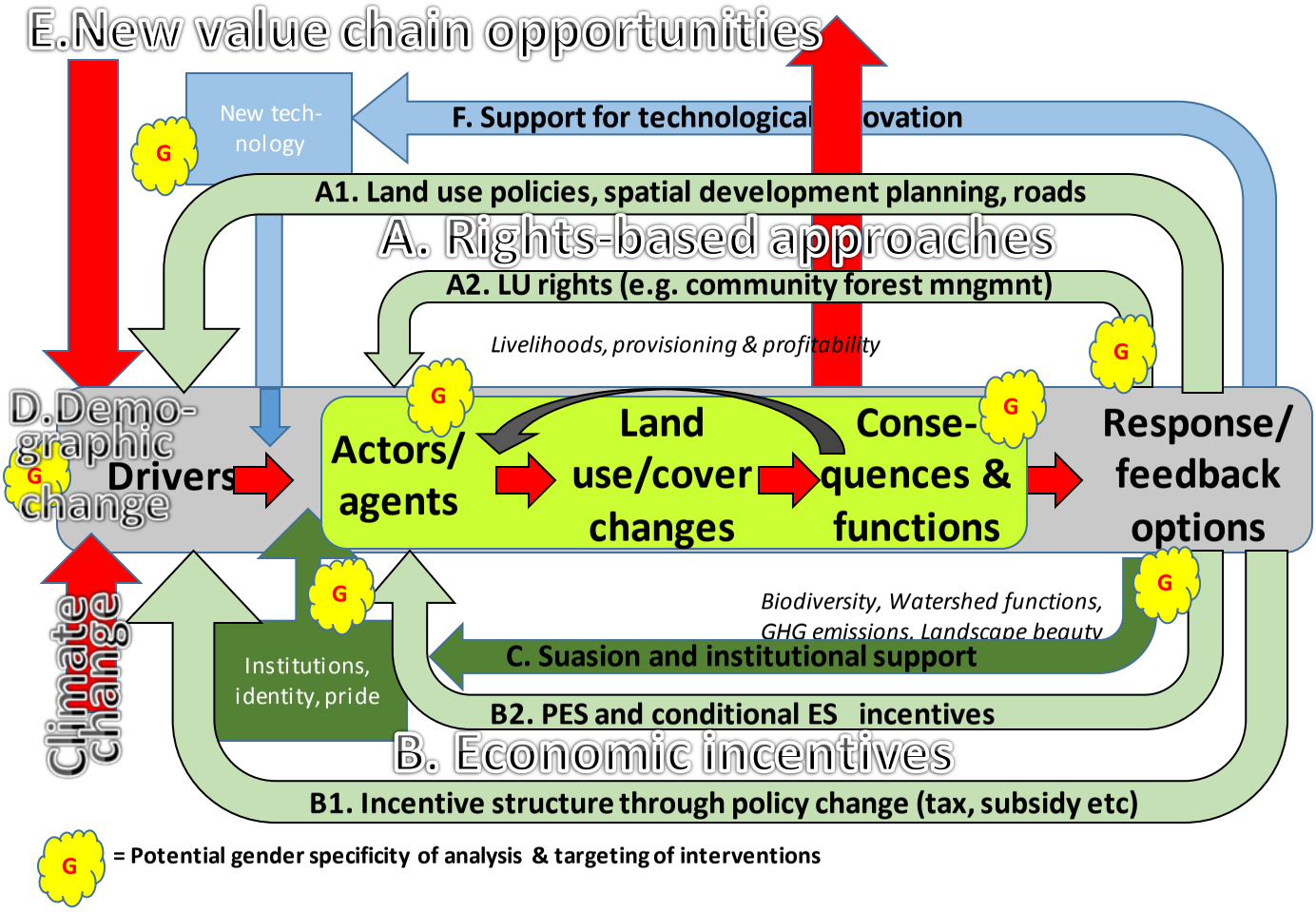
A team of researchers from various institutions in Africa, Asia and Europe carried out a study to assess the role of trees on agricultural land and the amount of carbon they have sequestered from the atmosphere over the past decade. The study, entitled Global Tree Cover and Biomass Carbon on Agricultural Land: The contribution of agroforestry to global and national carbon budgets, looks at biomass carbon on agricultural land both globally and by country, and what determines its distribution across different climate zones.

Biomass on agricultural land globally

"Remote sensing data show that in 201 0, 43% of all agricultural land globally had at least 1 0% tree cover, up from eight percent in the preceding decade," said Robert Zomer of the World Agroforestry Centre, lead author of the study. "Given the vast amount of land under agriculture, agroforestry may already significantly contribute to global carbon budgets."

Read further

- Global Tree Cover and Biomass Carbon on Agricultural Land: The contribution of agroforestry to global and national carbon budgets. Scientific Reports 6, 29987 (2016). doi:10.1038/srep29987



G = Potential gender specificity of analysis & targeting of interventions

Scientists identify another cause of the fires in Indonesia

For decades, the countries on either side of the Malacca Strait have been arguing about what causes the annual fires on Sumatra Island in Indonesia and what can be done to stop them. It's not only smallholders and plantations, say Andree Ekadinata, Meine van Noordwijk, Suseno Budidarsono and Sonya Dewi

'We have identified another group that has a hand in starting the fires in Sumatra', said Meine van Noordwijk, Chief Science Advisor with the World Agroforestry Centre and leader of the Centre's research team.

Previously, the finger had been pointed exclusively at both small- and large-scale farmers in Riau province on Sumatra Island, who were blamed for the choking smoke smothering Singapore and parts of Malaysia in June 201 3.

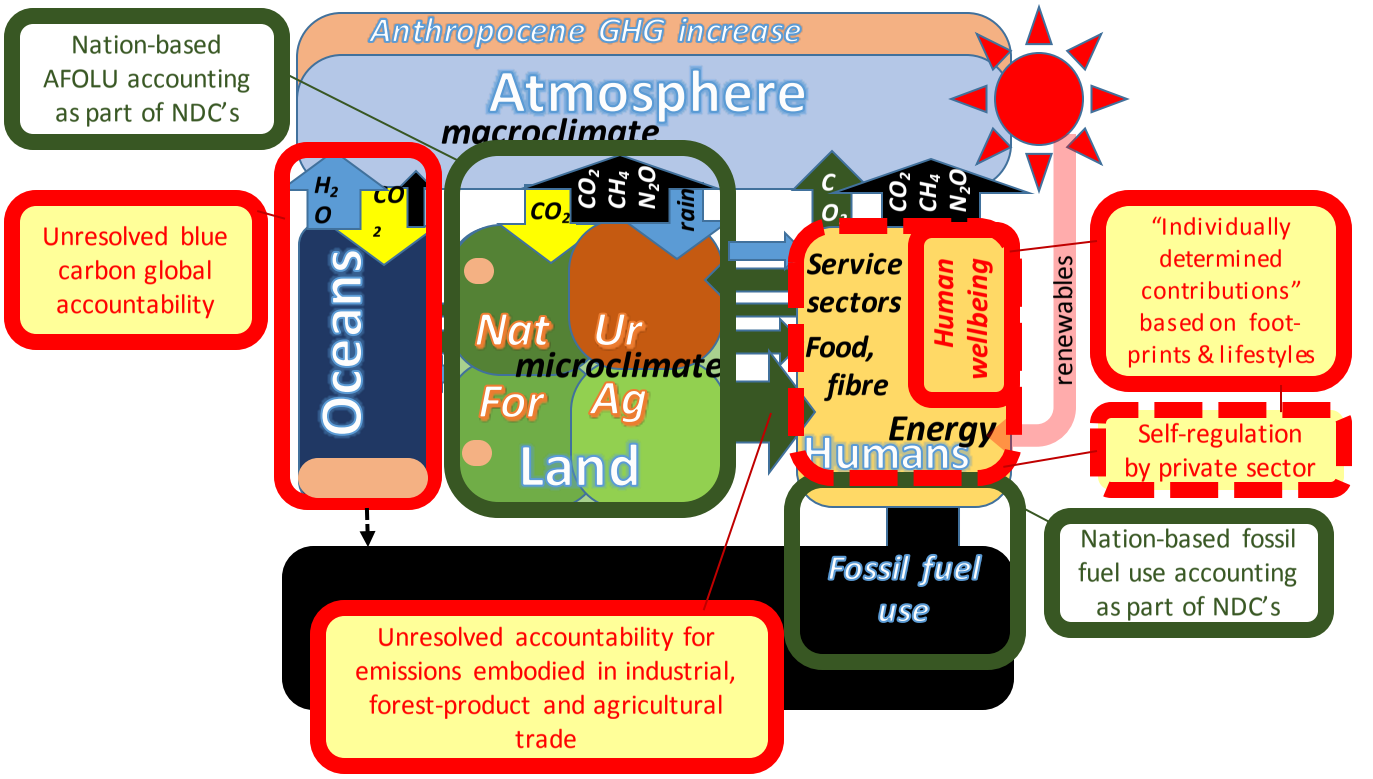
'The third category of fire starters we call "mid-level entrepreneurs". These entrepreneurs buy unregulated access to land for oil palm and clear it by burning, seemingly unrestrained by government', said van Noordwijk. The research team at the World Agroforestry Centre, who have been studying land conversion in Sumatra, say this third group is made up of local land investors who operate outside the government system, making them potentially more difficult to regulate.

'These people acquire land under informal rules at village level', said Suseno Budidarsono, a researcher with the Centre. 'They effectively sidestep the Government's land-use system. They bring in their own labour to clear the land for oil palm, regardless of the land's formal government status and in the absence of any permits to do so'.

According to the team, policies and policing need to be adjusted to deal with the newly identified group if the annual fires and subsequent haze that blankets neighbouring countries are to be reduced. Holding plantation companies accountable for the fires within their boundaries would help reduce the problem but not extinguish it. They have published their findings in a policy brief.

Read further

- Hot spots in Riau, haze in Singapore: the June 2013 event analyzed. ASB Policy-brief No. 33


Nation-based AFOLU accounting as part of NDC's
Anthropocene GHG increase
Atmosphere
macroclimate
Unresolved blue carbon global accountability
Oceans
Nat Ur
microclimate
For Ag
Land
Service sectors
Food, fibre
Energy
Humans
Human wellbeing
renewables
"Individually determined contributions" based on foot-prints & lifestyles
Self-regulation by private sector
Nation-based fossil fuel use accounting as part of NDC's
Fossil fuel use
Unresolved accountability for emissions embodied in industrial, forest-product and agricultural trade

Reducing emissions from all land uses in Tanjung Jabung Barat

By Rob Finlayson 7/4/2013

Indonesia is creating low-emissions development plans from national to district levels and the World Agroforestry Centre is providing technical assistance. On a visit to one of the research sites, Atiek Widayati, coordinator of the REALU Indonesia team, was impressed with progress I recently visited the district of Tanjung Jabung Barat, Jambi province, on the island of Sumatra in Indonesia, which is one of the research sites for the Reducing Emissions from All Land Uses (REALU) project, funded by the Norwegian Agency for Development Cooperation. REALU operates in several countries to find out how to reduce greenhouse gas emissions within an entire landscape rather than just from a particular activity or sector. In Indonesia, the project supports the Government's low-emissions development plans by providing important technical assistance.

There are several ways this support is demonstrated in Tanjung Jabung Barat. For example, they are using a method developed by the World Agroforestry Centre, known as Land-Use Planning for Low-Emissions Development Strategies (LUWES), in collaboration with the Government's District Planning and Development Agency. The agency is creating a technical document on how to reduce greenhouse gas emissions, including mitigation actions, under the strong leadership of the head of the agency, Bp. Ir. H. Firdaus Khatab MM. This document is crucial, since it will be the reference point for any formal documentation for low-emissions development in the district's spatial plans. The next step once it is completed will be to seek the endorsement of the district government's leadership.

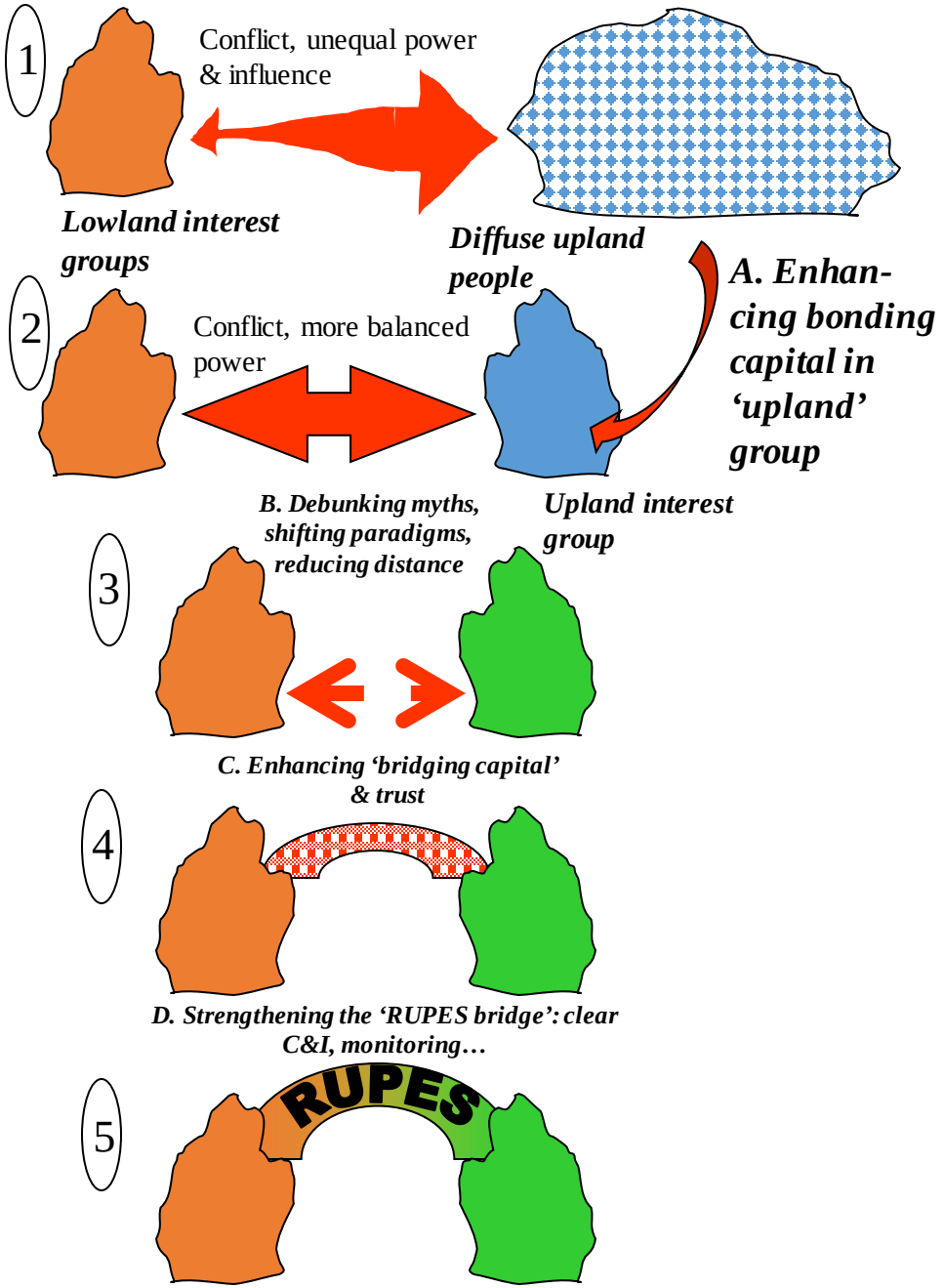
At the sub-district level, the 1 6 000 hectare Protected Peat Forest (Hutan Lindung Gambut/HLG) is the focus for emission reductions work. Our main effort is directed at community-based peat forest protection, working with key

people within the District Forestry Office (Dinas Kehutanan) and, in particular, the Head, Bp. Ir. H. Erwin, an enthusiastic supporter of the project who pushed all else aside in his hectic schedule in order to meet us when I visited the area in April–May 201 3. Indeed, we received supportive and positive responses from all staff of the Forestry Office, particularly in regard to our facilitation work with farmers who use the protection forest, which has helped build a good relationship between the farmers and the Office. The forest's legal status that we are working to achieve with the farmers is called Hutan Kemasyarakat (HKm/Community Forest) and the good cooperation we have established is critical for achieving it.

We use a 'landscape approach' to deal with the complexity of issues that are part of any watershed or other larger geographic area and it is evident that micro-works conducted at the sub-landscape level are an important foundation for achieving good performance at the larger scale. A landscapewide approach could be spongy and filled with gaps without these smaller, detailed and intricate activities.

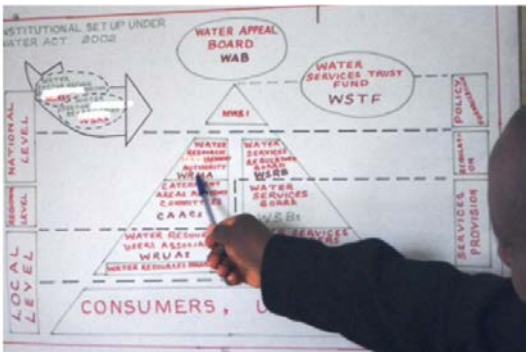
Read further

AF2 From conflict to cooperation



Can nature's services be bought and sold?

By Rob Finlayson 2012/10/30/

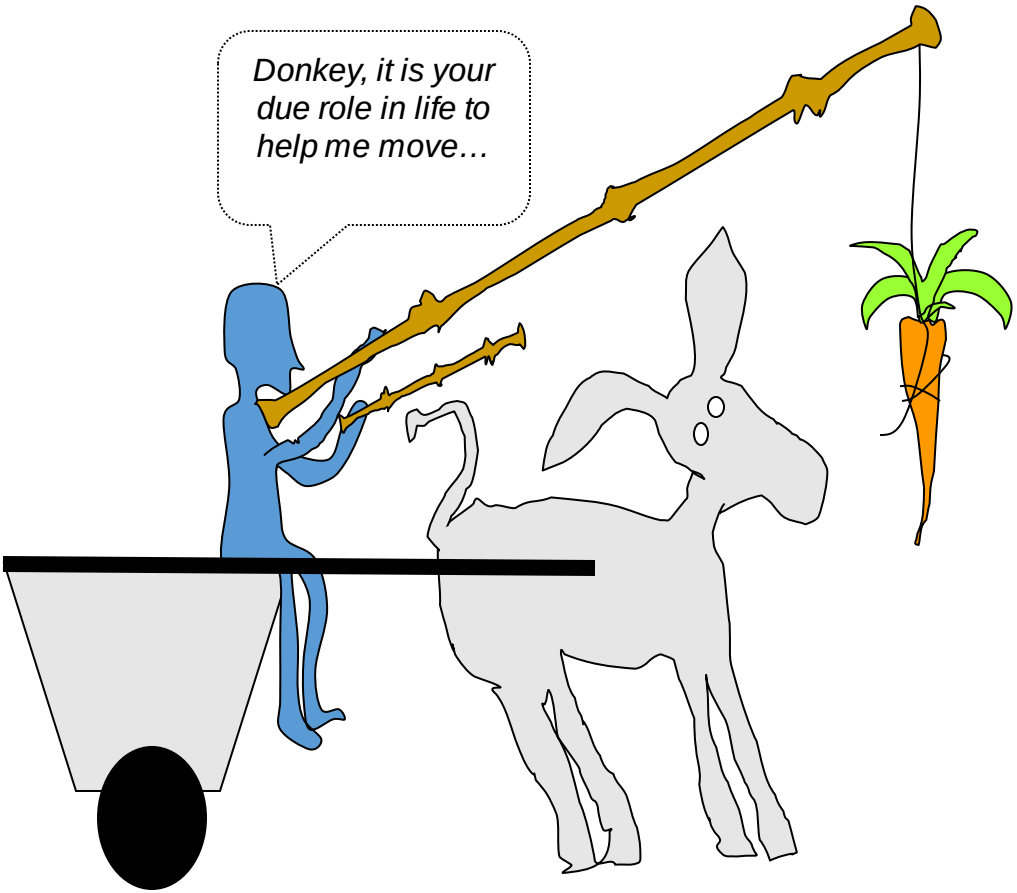


Over the past decade, governments in several developing countries, along with hydropower and drinking water companies and wetlands managers, have adopted 'payments for environ-mental services' schemes. What are they? Are they working? What are the pitfalls such schemes need to avoid? Can they adapt to local circumstances? The Centre's chief science adviser, Meine van Noordwijk, provides some answers. And asks some more questions.

The 1972 Stockholm conference (20 years before Rio 1 992, 40 years before Rio +20), declared that natural resources must be safeguarded and that the Earth's capacity to produce renewable resources must be maintained.
It also stated that developing countries needed reasonable prices for exports in order to carry out environmental management. A number of economists around that time, including the first Nobel laureate in economics, Jan Tinbergen, started to analyze the relationship between natural capital, environmental services and development.
Putting a value on nature's services was seen as a way to get the attention of policymakers rather than necessarily implying that nature's services can be bought.

Economists analyzing the issue fell into two broad types: 1) 'environmental economists', who dreamed of a world where all services provided by the environment—such as clean and plentiful water, storage of carbon, protection of soil and provision of food and other materials—had a market-based price tag so that decision makers in the private sector and government could take full account of all the environmental—and fiscal—effects of all actions that had an effect on the natural environment; and 2) 'ecological economists', who dreamed of a world where economic decisions were subservient to the ecology of the planet and the needs of future generations.
Is it possible to put a value on nature in a way that reconciles the two approaches? Does it help to pay farmers to adopt practices that increase the levels of environmental services in the landscape they farm?

Read further



Sticks, sermons or carrots? What is the best way for the farmer to get the donkey to move towards the market?

Certifying eco-friendly rubber to protect biodiversity

By Grace Villamor /201 2/11 /06

Indonesia's rubber agroforests harbour nearly as much biodiversity as primary forests. Yet they, too, are under threat. Can 'green' rubber help save them?

Studies of rubber agroforests in Jambi province in Indonesia have found that their physiognomy and functioning are close to those of natural forests. Although most of the complex rubber agroforests have disappeared in Malaysia and Thailand, around 2 million hectare are still thriving in Indonesia. How ever, if left neglected they will soon be converted to agriculture and industrial plantations. And since little primary forest is left in the country, maintaining these forests is the only option to support high forest diversity.

In the absence of specific incentives, there is no reason w hy smallholders should agree to forego the benefits of more profitable land uses for the sake of biodiversity conservation. Eco-certification or eco-labelling of rubber agroforests has been explored by the World Agroforestry Centre for the past decade as a mechanism f economic development in rubber-growing are

This kind of scheme guarantees that the production practices used to generate a Product meet a set of eco-standards, or that the raw materials of the product are produced in biodiverse systems, and verifies that producers have used management practices that conserve environmental services.

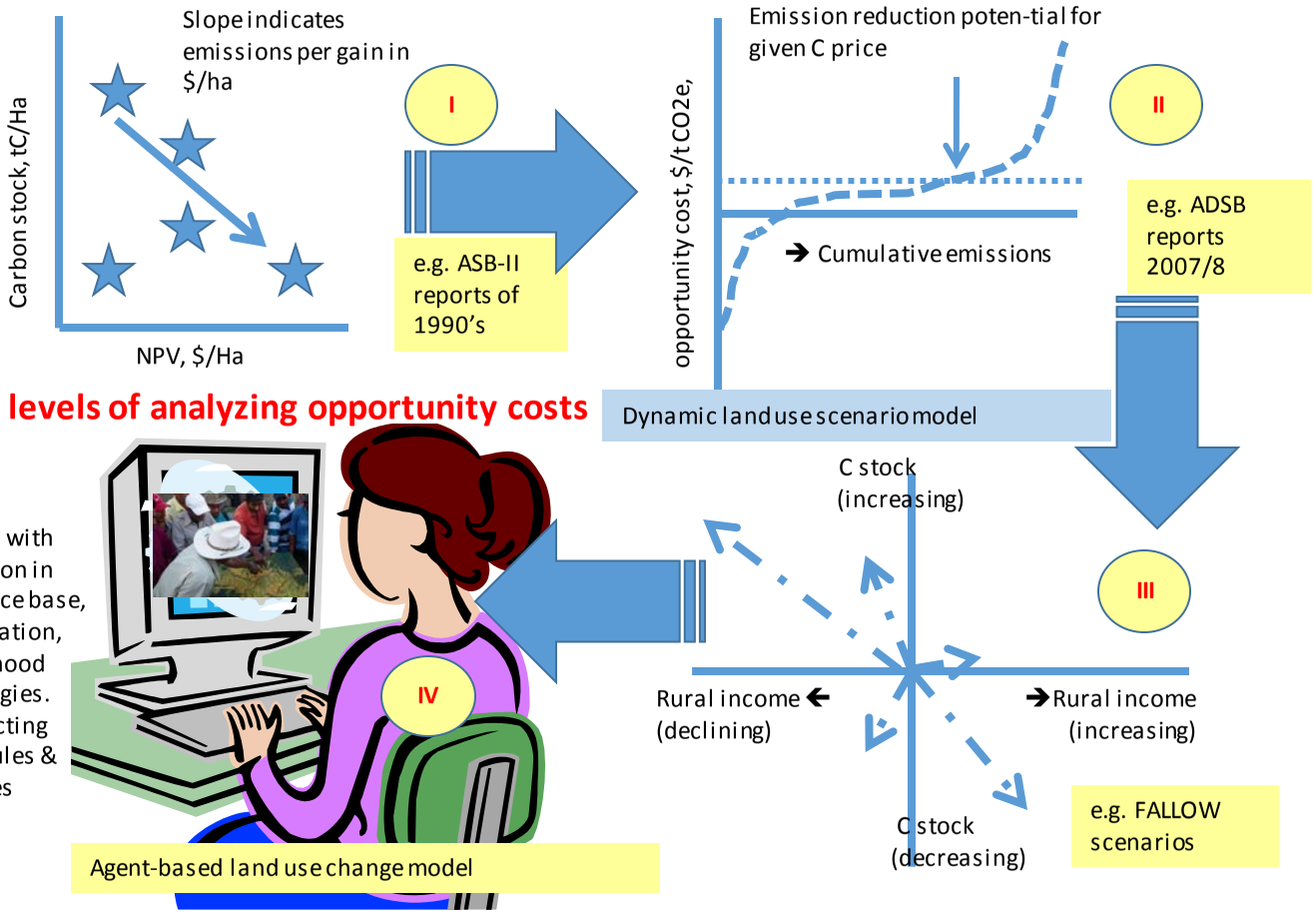
Thus, selling eco-labelled rubber latex at a price higher (a 'price premium') than the average, 'farmgate' price would increase farmers' economic returns from rubber agroforests. Clean and dry 'green' rubber currently sells for around USD 3 per kilogram, w hich is twice the farmgate price for 'non-green' rubber. Though there is no substantial market yet for certified rubber products, some interest has been shown by companies and negotiations are underway. About 30% of the natural rubber latex is used for tyre manufacture and the production of natural rubber is mainly in Asia. Hence, there is a great potential to develop the market, as a huge number of natural rubber consumers are still untapped. How ever, there are still constraints that would affect the decisions of farmers to adopt a scheme that creates 'green' rubber.

The constraints include standards that could be very difficult for farmers to achieve; no factories as yet w illing to receive eco-certified rubber; conflict with government policy that promotes oil palm companies (no government

Read further

Tradeoff at land use system level

Opportunity cost at landcape scale



The cost of an orangutan's forest

by Rob Finlayson · April 12, 2013

The Tripa peat swamp-forest in Indonesia is one of the few remaining Sumatran orangutan habitats but its situation is conflicted: it is designated as part of the Leuser Ecosystem Zone but also as 'non-forest use' and experiences persistent development of oil palm plantations, *say Hesti Lestari Tata, Atiek Widayati, Meine van Noordwijk and Elok Mulyoutami*

In Aceh Province, Sumatra, Indonesia, there is a remnant peat swamp-forest in the Tripa area that is an important habitat for Sumatran orangutan (*Pongo abelii*), an endangered species on the International Union for the Conservation of Nature *Red List*.

Tripa peat swamp is known for its deep peat soil, even though the forest is not designated as 'forest' but instead is categorised as non-forest, 'other land-use area' (*Area Penggunaan Lain*). It is also classified as a nature conservation area that is part of the Leuser Ecosystem Zone (*Kawasan Ekosistem Leuser*), enacted by presidential decree in 1998.

Orangutan nest in Tripa forest.
Photo: ICRAF/Rahayu Oktaviani

This kind of conflicting designation by different Government bodies at different levels is common under Indonesia's 'pluralistic' governance system.

Partly as a result of this lack of clarity, Tripa continues to experience heavy pressure for conversion of its forests to oil palm plantations and other agricultural production.

The average rate of oil palm expansion since most of the *Hak Guna Usaha* or concession rights were issued in the mid-1 990s to 2009 was 1 500 hectare per year. The highest loss rate of forest to oil palm plantations was 3300 hectare per year during 2005–2009.

Local people have tended to establish smallholding oil-palm plots because the crop's profitability is very high compared with other commodities in Tripa thanks to a robust global market for palm oil as vegetable oil and biofuel. A steep increase in the amount of smallholding oil palm in Tripa was primarily caused by the high profitability of the crop and several accessible mills in the area.

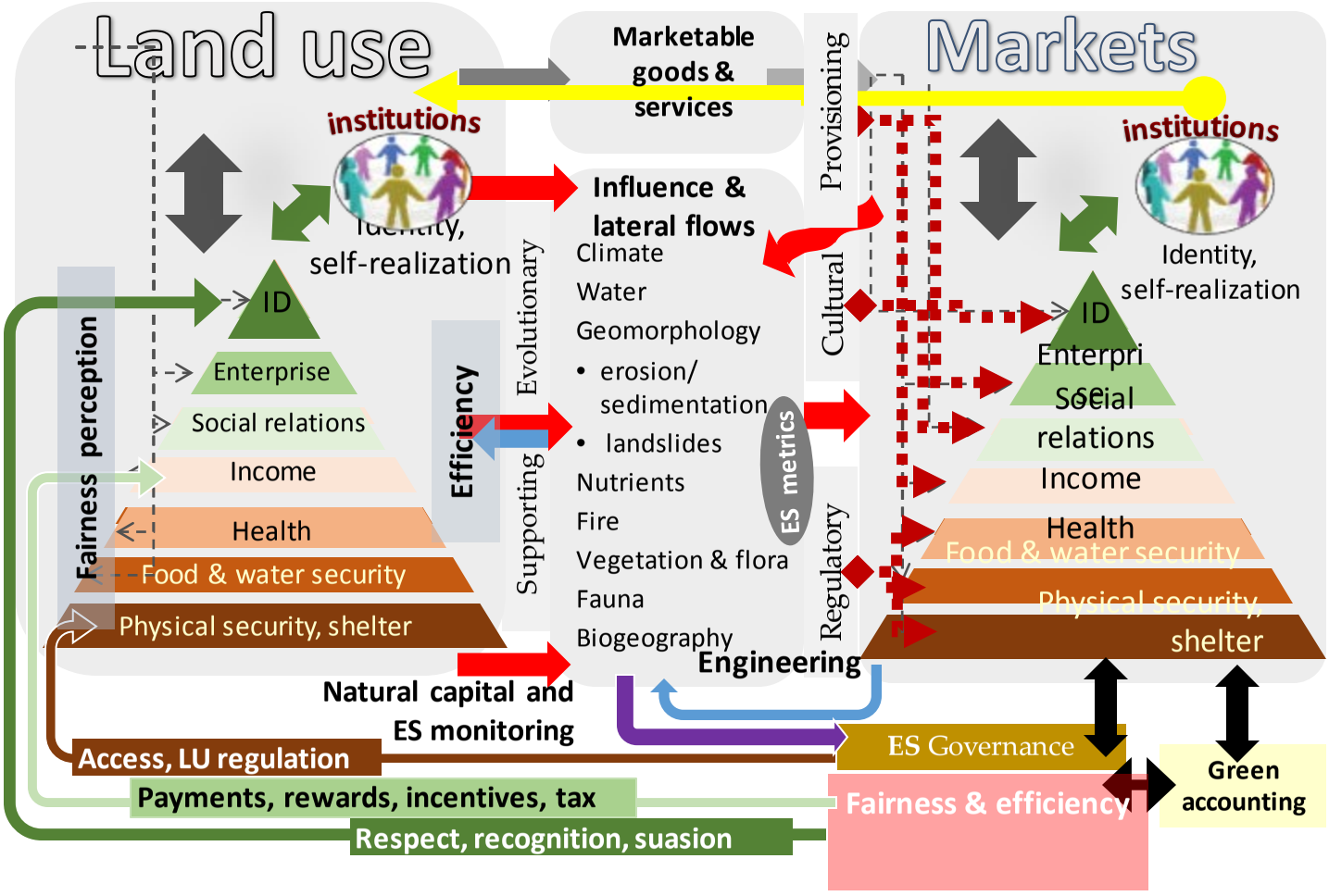
The high profitability also causes a high 'opportunity cost' for avoiding forest conversion.

'Opportunity cost' has been defined as the value of something that must be given up to achieve something else. Since everything, including land and forests, can be used in alternative ways, every change to a forest, such as its removal so that other activities can take place on the land, has an associated opportunity cost.

Opportunity cost is one of three cost categories for REDD+ schemes. In this case, it is the ratio of the changes in profitability (USD per hectare) and the changes in carbon stock, which can be expressed as emissions (tonnes of carbon-dioxide equivalent per hectare or tCO2e/ha).

At a carbon price threshold of USD 5 per tCO 2e, only about 41 % of carbon emissions from land use, including forest conversion, in Tripa could be avoided.

Read further


Land use
Marketable goods & services
Markets
institutions
Influence & lateral flows
Provisioning
Cultural
Regulatory
Supporting
Evolutionary
Identity, self-realization
ID
Enterprise
Social relations
Income
Health
Food & water security
Physical security, shelter
Fairness perception
Efficiency
Climate
Water
Geomorphology
• erosion/ sedimentation
• landslides
Nutrients
Fire
Vegetation & flora
Fauna
Biogeography
ES metrics
Engineering
Natural capital and ES monitoring
Access, LU regulation
Payments, rewards, incentives, tax
Respect, recognition, suasion
ES Governance
Fairness & efficiency
Green accounting

Co-investment' schemes for ecosystem services are more likely to succeed

2013/08/29/

People creating payments-for-ecosystem-services schemes need to reorient their thinking from strict financial transactions based on performance towards 'co-investment', *says Leony Aurora*

Co-investment typically involves various groups with different types of assets working together to achieve agreed goals. These types of ecosystem services' schemes are more likely to be successful, a decade of research in Asia shows. Practitioners involved in these schemes need to look at the exchange of other types of capital other than purely the financial kind, such as social and human capital, according to Meine van Noordwijk, chief science advisor at the World Agroforestry Centre . Payments-for-ecosystem-services (PES) schemes are not only about efficiently keeping costs to a minimum to achieve the best quality ecosystem service—which is the goal of performance-based payments' schemes—but neither are they only about fairness, where communities' rights and efforts are respected and rewarded regardless of outcomes. 'There's a lot of space in between', he said. The World Agroforestry Centre began the Rewards for, Use of, and Shared Investment in Pro-Poor Environmental Services (RUPES) project in 2002, in a partnership with the International Fund for Agricultural Development. RUPES set out to learn lessons about PES, particularly on underresearched agricultural land, in six countries in Asia.

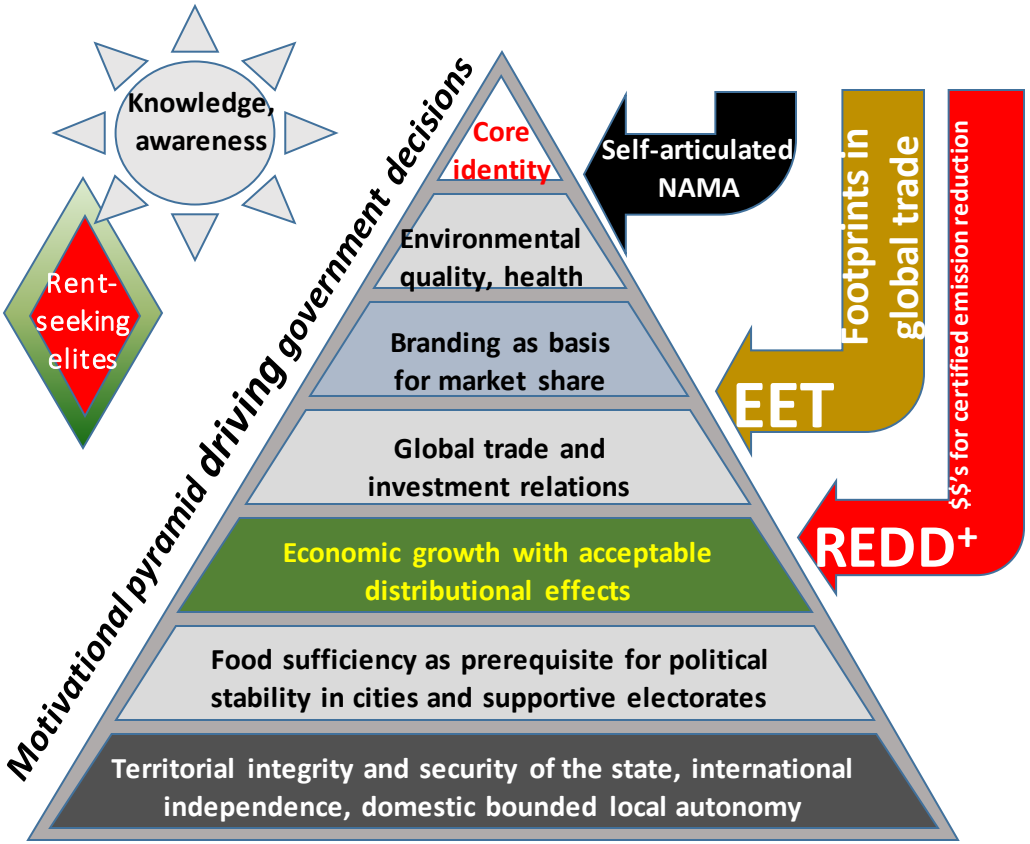
Van Noordwijk and Beria Leimona, the Centre scientist who headed the project, were presenting their key results in front of 400 scientists at the 6th Annual International Ecosystem Services Partnership Conference in Bali, 26–30 August 2013. During the early days of RUPES, which was located mostly in water catchments, the dominant complaint from the farmers and local communities who lived upstream and 'provided' ecosystem services, such as clean water and reduced sedimentation, was that the beneficiaries of the services who lived downstream 'never even said thank you', according to van Noordwijk. This highlighted what he calls the 'pico-economics' at play, namely, how humans often make decisions that are not strictly rational — because if they did then the option with the most tangible benefits would win —but also emotional.

PES was initially designed as a simple mechanism where buyers and sellers exchanged money for certain environmental services (for example, landscape beauty, air, water, healthy soils, biodiversity). In this commodification-of-nature model, payments will not be made if a service is not delivered. Another type of scheme was built around the idea of compensation for opportunities lost, for example, owing to restricting the use of land. The third type of scheme identified by the RUPES project was the 'co-investment' kind in which everyone with an interest in the land in question agreed on what the problems with it were, what were the possible solutions and committed the different assets they had—whether financial, social or biophysical—to achieve a solution. This kind of scheme places everyone on a more equal footing as partners and co-investors, where contested opinions have to be respected.

An example of the importance of social aspects in a scheme that attempted to improve not only the environment but also livelihoods of poor farmers was demonstrated at a RUPES site at Lake Singkarak in West Sumatra, Indonesia. Farmers upstream of the rivers feeding into the lake were engaged under a voluntary carbon scheme to reforest the slopes. However, even though the financial side was ready—a buyer in Europe was willing to pay for tree planting and maintenance—the project did not perform well because the farmers felt inadequately represented by their customary institution, which was run by local elites and was the main liaison with the buyer. 'The farmers decided to form new local groups to represent them based on the locations of their parcel of lands', said Leimona. 'This shows that having just a financial transaction without a social and cultural context might not lead to an operationally sustainable PES scheme, particularly in developing countries'.

Read further

NAMA expresses core identity of a country, while REDD+ im-plies being paid for someone else's agenda. In between is the 'branding' or ('good name') needed to maintain exports and the emissions embodied in those



Reducing emissions from land use in Indonesia: motivation, policy instruments and expected funding streams (2014) Mitig Adapt Strateg Glob Change, 19(6), 677-692

Recommendations for national carbon-emissions monitoring systems

By Rob Finlayson April 11, 2013

Nations need to be able to account for their carbon stock in order to know if they are reducing greenhouse gas emissions or not. Different techniques give different results, depending on the level of precision, and there are certain things that can be done to make it clear, *say Meine van Noordwijk, Sonya Dewi, Betha Lusiana, Degi Harja, Fachmudin Agus, Subekti Rahayu, Kurniatun Hairiah, Maswar, Valentina Robiglio, Glen Hyman, Douglas White, Peter Minang, Lou Verchot and Vu Tan Phuong*

Recommendations on the design of national monitoring systems relating the costs of monitoring to the expected benefits of higher quality of data

The international mechanism to reduce deforestation and forest degradation (REDD+) seeks to establish 'performance-based' financial instruments to make forests more valuable standing than destroyed.

To achieve this, trusted, reliable and transparent national carbon accounting systems are essential. But the accuracy of the estimates of carbon stock and emissions depends strongly on scale: methods that are sufficient for reliable national accounting may not be accurate at local site level.

The proposed REDD implementation mechanisms thus influence the required levels of precision at specific scales and the benefits that stakeholders can obtain from investment in better data.

Within a general scheme of the type of tree, forest, soil and land management practices that are needed to estimate emissions, we reviewed a number of datasets to assess sources of bias and random error, linked to the level of replication that is needed to achieve specified precision. We also summarized data on the costs of data collection at a number of scales, with different levels of precision. In combination, the costs and benefits of investment in data quality can be weighed and a balance achieved between achievement and 'transaction costs' (to which the costs of designing a monitoring system contribute).

To be cost effective, national monitoring systems can build on existing forest inventories and soil data but they need to be analyzed for bias and variability to assess adequacy for carbon-stock appraisals.

Examples for Indonesia show the gap between these data and intensive ecological studies: reconciliation of the data sources requires reanalysis of the site selection for ecological studies and of pre-1990 logging across the country.

Based on our research, we have devised 10 recommendations for national monitoring systems that combine biophysical and institutional dimensions of system design.

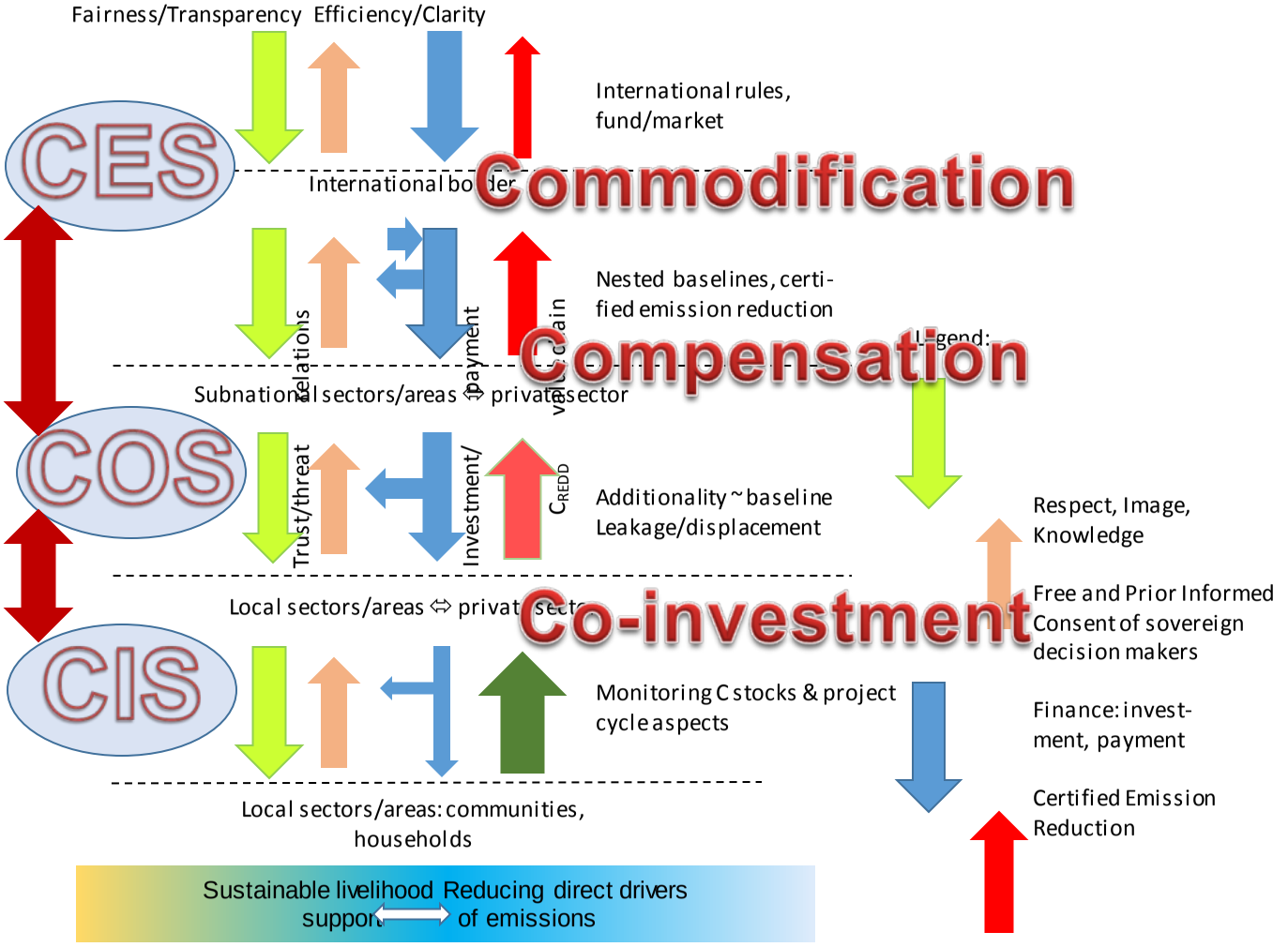
1) Start with what you have: forest department data, agricultural statistics, land-cover studies, spatial planning zones, existing use rights, soil maps and soil-fertility databases can all contribute important information.

2) Expect gaps and mismatches between data sets, especially where institutional and biophysical concepts use the same terms (for example, 'forest').

3) A national monitoring system is dependent on three characteristics:

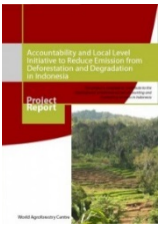
   a. Salience (does it address key policy issues and respond to policy implementation within a relevant time scale?)

Read further in:
http://blog.worldagroforestry.org/index.php/2013/04/11/recommendations-for-national-carbon-emissions-monitoring-systems/


Fairness/Transparency
Efficiency/Clarity
CES
International rules, fund/market
International border
Commodification
Nested baselines, certified emission reduction
Relations
Payment
Value chain
Legend:
Compensation
Subnational sectors/areas ⇔ private sector
COS
Trust/threat
Investment/
C_{REDD}
Additionality ~ baseline
Leakage/displacement
Respect, Image, Knowledge
Local sectors/areas ⇔ private sector
Co-investment
Free and Prior Informed Consent of sovereign decision makers
CIS
Monitoring C stocks & project cycle aspects
Finance: investment, payment
Certified Emission Reduction
Local sectors/areas: communities, households
Sustainable livelihood support
Reducing direct drivers of emissions

Helping Indonesia reduce its greenhouse gas emissions

By Rob Finlayson February 15, 2013



One of the most important projects in the fight against global warming has made public its final report, *say Suyanto and Sonya Dewi, the project's leaders*

Indonesia has been well-known in scientific circles as the third-highest emitter of greenhouse gases in the world, after the USA and China. Most of those emissions come from land uses and land-use changes, particularly deforestation.

However, Indonesia is also one of the world leaders in acting quickly to try and reduce its emissions.

To help the Government of Indonesia identify sources of emissions and design ways of reducing them, the European Union funded the World Agroforestry Centre to implement a ground-breaking project called Accountability and Local Level Initiatives to Reduce Emissions from Deforestation and Degradation in Indonesia (ALLREDDI).

We worked in close partnership with the Government's Directorate General of Forest Planning, Ministry of Forestry, Brawijaya University and the Indonesian Centre for Agricultural Land Resources Research and Development to create national carbon accounting and monitoring systems that complied with the Tier 3 reporting guidelines of the Intergovernmental Panel on Climate Change.

At its core, the three-year project helped improve the technical capacities of provincial and district government staff and designed practical, achievable schemes for reducing emissions from deforestation and degradation (REDD) in five pilot areas in western, central and eastern Indonesia: Jambi, Gorontalo, Papua, South Kalimantan and Pasuruan.

This involved training in the use of methods developed in the project for estimating carbon stocks at plot level through field measurements and computer modelling for both above- and belowground stocks and on both mineral and peat soils. We also trained staff in extending estimations to the level of landscapes through quantification of land-use and land-cover changes, beyond the loss of natural forest.

To support the field work, detailed, time-series, land-cover maps (1990–2005) were created from satellite imagery and field surveys that showed, for the first time, the extent of forests, agroforests and agricultural land across the nation. The maps also enabled everyone to see how these land uses had changed over time and where, and how, emissions occurred.

Read further in:
http://blog.worldagroforestry.org/index.php/2013/02/15/helping-indonesia-reduce-its-greenhouse-gas-emissions/

Finding long-term solutions for degraded peat land: video

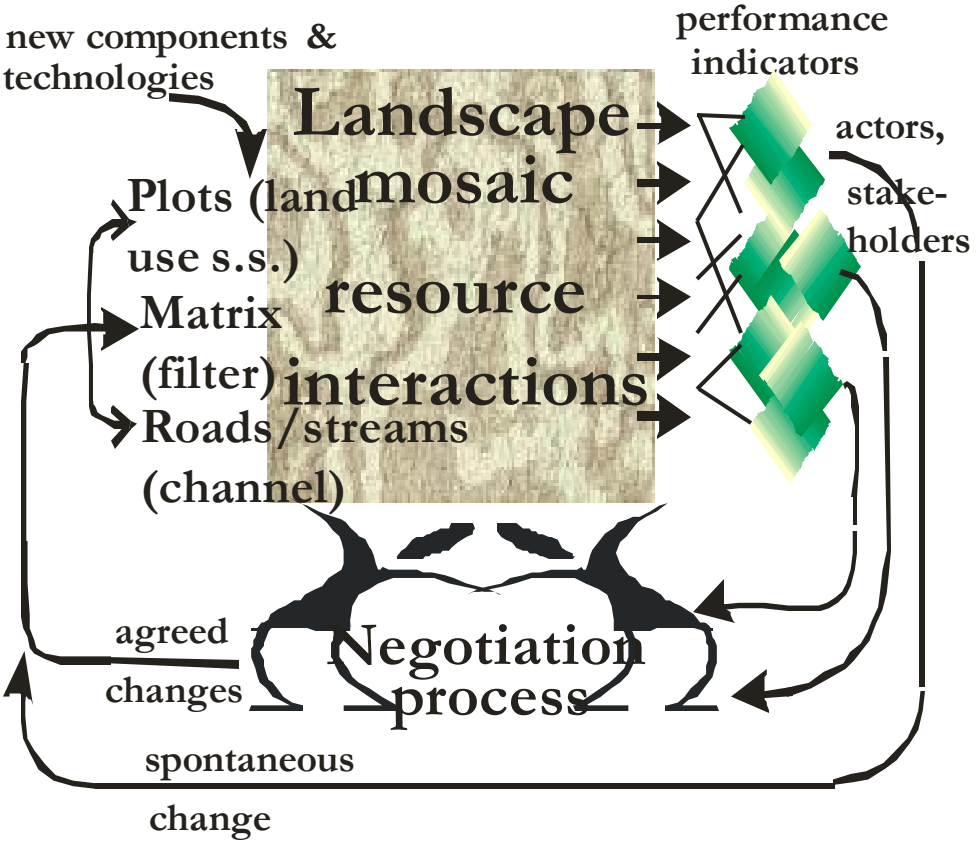
By Rob Finlayson

A video has been released that documents research in Jambi Province, Indonesia on how best to reduce greenhouse-gas emissions from land use on peat, including intercropping oil palm and other crops.

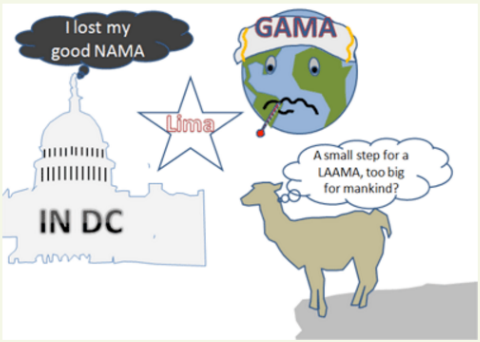
A video released by the World Agroforestry Centre documents the background and research carried out by a team of Indonesian and international scientists to help the Tanjung Jabung Barat district government on the Indonesian island of Sumatra identify which parts of the district have been producing the most greenhouse gasses from different land uses.

Read further in:
http://blog.worldagroforestry.org/index.php/2016/04/18/finding-long-term-solutions-for-degraded-peat-land-video/

AF2 Negotiation Support System (NSS)



LIMA: NO LAAMA, NO GAMA, AS INDC'S REPLACE NAMA



By Meine van Noordwijk

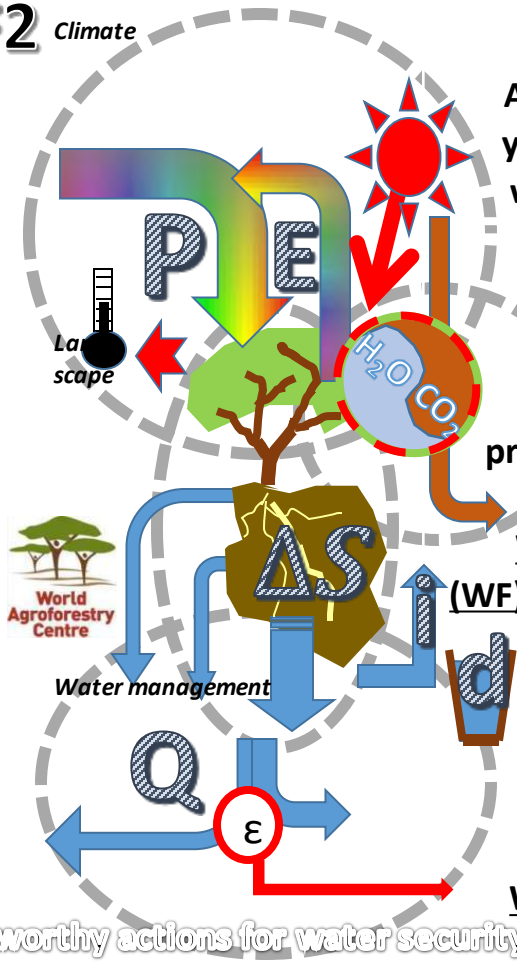
There is little confusion about what would be globally appropriate mitigation actions (GAMA) to keep the warming of our planet in the range of 2 degrees Celsius. Beyond that level of warming planetary feedbacks may kick in, such as changes in oceanic circulation, which are hard to control. There is also little uncertainty in most places, what locally appropriate adaptation and mitigation actions (LAAMA) could look like, to ensure that sustainable development progresses and/or remains in reach. Often such options will include forests, trees and agroforestry. The specifics will be highly context dependent, with external financial co-investment crucial in the poorest (least developed) countries. But, between this GAMA and the many LAAMA's there's a gaping hole.

The UN Framework Convention on Climate Change (UNFCCC) was created in Rio in 1992 – at a time that the world seemed to be divided into two parts, I) rich (developed) countries that had not only caused most historical emissions that caused climate change, but were also emitting the most at the time, and II) poor, developing countries that were to suffer most from climate change but had little role in either historical or current emissions. The code sentence became 'common but differentiated responsibility'.

Read further in:
http://asb.cgiar.org/blog/lima-no-laama-no-gama-indcs-replace-nama

AF2 microclimate – missing link between mitigation and adaptation

AF2 *Climate*



Water yield (WY): Annual blue-water yield versus green-water use (cooling + rainbow water), biological rainfall generation

Water use (WU): products in demand?

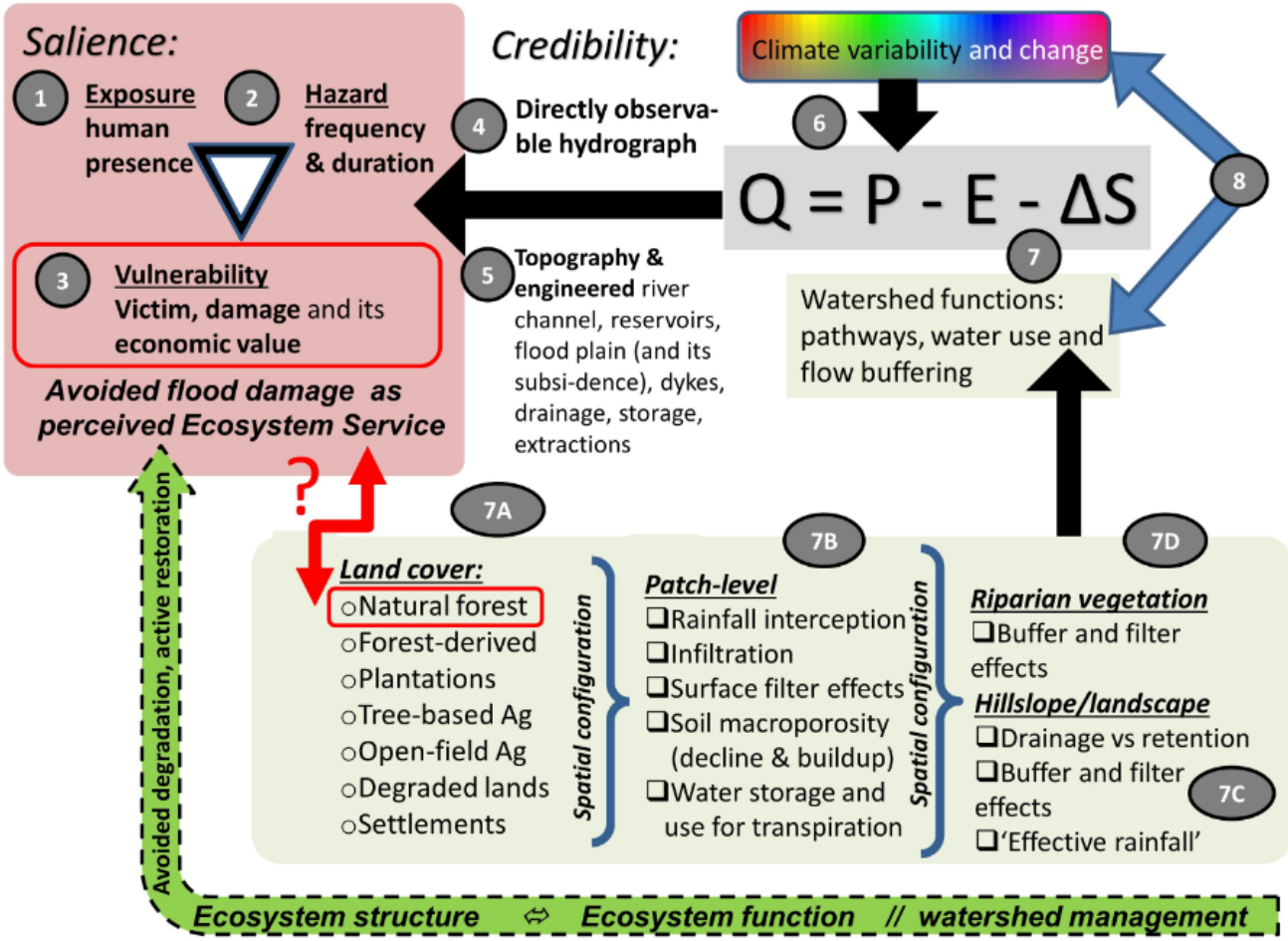
Water Flow regime (WF): Flow persis-tence of blue water

Sediment load (WS): Controlling sediment load of rivers

Water quality (WQ)

PES-worthy actions for water security:

WY1: Restoring vegetation-level water use to natural ET to maintain ecological flows & aquatic life,
WY2: Replacing fast-tree plantations with low-ET species of high utility,
WY3: Maintaining green water use as contribution to atmospheric recycling;
WF4: Increasing deep rooted trees; promoting litter layers and agricul-tural practices that increase infiltration and soil water storage,
WF5: Modifying operating rules for reservoirs and hydropower schemes;
WS6: Enhancing sediment filter strips in fields and across landscape matrix,
WS7: Protecting river banks, riparian zones and landslide-prone slopes;
WQ8: Protecting springs, riparian zones and sources of domestic water
WQ9: Promoting multifunctional shade tree management for reducing pesticide and fertilizer uses,
WQ10: Waste-water treatment to match biological recovery from (organic) pollutants.


Salience:
1 Exposure human presence
2 Hazard frequency & duration
3 Vulnerability
Victim, damage and its economic value
Avoided flood damage as perceived Ecosystem Service
Credibility:
4 Directly observable hydrograph
5 Topography & engineered river channel, reservoirs, flood plain (and its subsi-dence), dykes, drainage, storage, extractions
Climate variability and change
6
Q = P - E - ΔS
7
8
Watershed functions: pathways, water use and flow buffering
?
7A
Land cover:
Natural forest
Forest-derived
Plantations
Tree-based Ag
Open-field Ag
Degraded lands
Settlements
Spatial configuration
7B
Patch-level
Rainfall interception
Infiltration
Surface filter effects
Soil macroporosity (decline & buildup)
Water storage and use for transpiration
Spatial configuration
7D
Riparian vegetation
Buffer and filter effects
Hillslope/landscape
Drainage vs retention
Buffer and filter effects
'Effective rainfall'
7C
Avoided degradation, active restoration
Ecosystem structure ⇔ Ecosystem function // watershed management

Agroforest landscapes to reduce the risk of floods?

By Rob Finlayson · May 11, 2017

There is a lack of evidence of the effects of trees on reducing, or worsening, floods. Argument continue about whether the research results that do exist from small-scale studies also apply at larger scales. A new technique is proving useful for finding evidence and better predicting trees' role in flood mitigation.

Not surprisingly, humans have found the subject of floods of compelling interest, especially, the extent to which removing trees from a watershed increases or decreases the risk of flooding. The pros and cons of deforestation have been hotly debated over the last 100 years and the basic concepts go back 2000 years. The debate oscillates between strong over-generalizations—encapsulated in statements such as 'forests are good for any aspect of water'—to disbelief in anything not supported by strong evidence.

For Meine van Noordwijk, Chief Science Advisor at the World Agroforestry Centre, the challenge in the debate is properly understanding things at scale. Does deforestation increase the risk of flooding from small to large scales—and even can any flood be attributed to removing or adding trees—or is the evidence primarily valid only at the scale of measurement and not necessarily beyond? For example, can the results of research in a small catchment be applied across a much larger landscape and help to decide whether more or less trees are needed to reduce flooding, or whether they have any effect at all?

A new article in the journal, *Hydrology and Earth System Science*, explores the middle ground in the debate and offers scientists an easier way of predicting river flow from rainfall and, consequently, the likelihood of flooding.

Read further:

- van Noordwijk M, Tanika L, Lusiana B. 2017. Flood risk reduction and flow buffering as ecosystem services: I. Theory on a flow persistence indicator. Hydrol. Earth Syst. Sci., 21, 2321–2340, http://www.hydrol-earth-syst-sci.net/21/2321/2017/
- ... II. Land use and rainfall intensity effects in Southeast Asia. Hydrol. Earth Syst. Sci., 21, 2341–2360 http://www.hydrol-earth-syst-sci.net/21/2341/2017/

F_p as metric

Supply

Demand

Land use options in context

Water use & soil properties

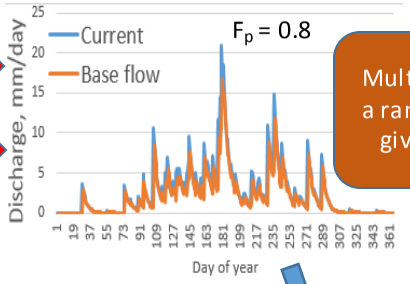
Hydrographs and F_p across years

Multiple LU scenarios

Economic costs & benefits

Opportunity costs of F_p increase

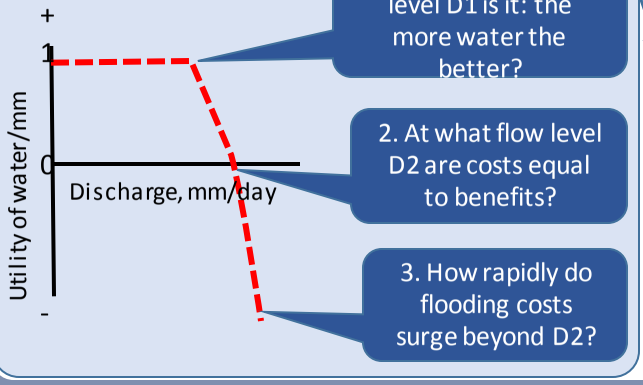
Stakeholders of river flow → Flow thresholds of usable water, damage by high flows

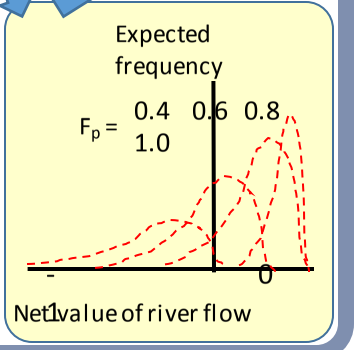


Multiple runs for a range of F_p's in given climate

Spatially explicit informed preference for F_p

Land use opportunities to maintain & restore F_p





Negotiations on co-investment in realistic performance-based restoration of watershed functions

Indonesia prepares to expand schemes that pay for environmental services

blog.worldagroforestry.org/index.php/2013/03/15/indonesia-prepares-to-expand-schemes-that-pay-forenvironmental-services/

Indonesia has been a leader in legislating for schemes that pay for environmental services such as clean and plentiful water supply. The implementing regulations that will encourage expansion are now being prepared and some important points need to be included, *says Beria Leimona*

Recently I presented at a media conference called by Indonesia's Minister for the Environment, Dr Balthasar Kambuaya. At the conference, Dr Kambuaya announced his ministry's intention to prepare regulations that would allow greater implementation of the 2009 law on environmental management, including schemes that provide for payments for environmental services. This could revolutionize land and water management throughout the archipelago.

I was there to help explain to the media the nature of these schemes in Indonesia and put them into a global context, owing to my role as coordinator of the 'Rewards for, use of, and shared investment in pro-poor environmental services' (RUPES), which was hosted by the World Agroforestry Centre with support from the International Fund for Agricultural Development.

RUPES had provided significant research results in Indonesia that contributed to the development of policies, the law, regulations and schemes. For example, in 2009, based on our and others' substantial input, the Government of Indonesia promulgated Law 32/2009, which directed apparently serious efforts towards expanding payments' schemes throughout the country. The law allowed for the creation of schemes to pay for environmental services, from private to private (individuals and companies), private to government and government to government.

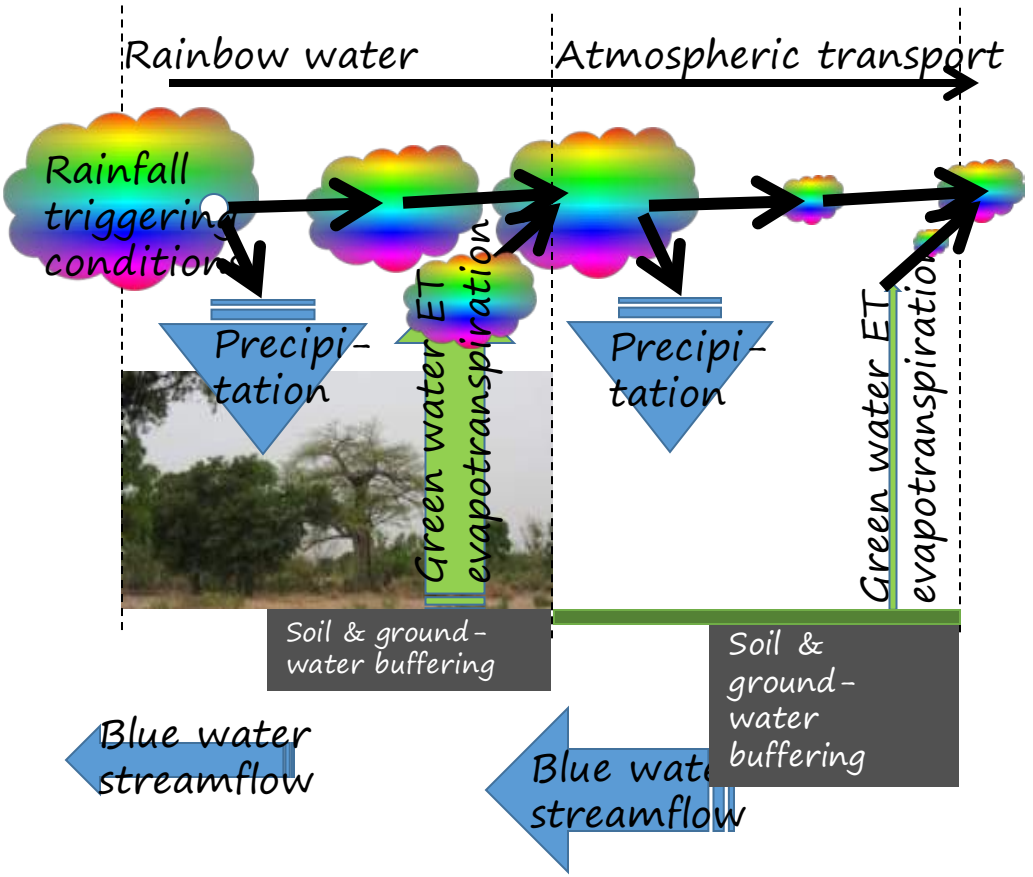
However, only now is the Ministry drafting the implementing regulations of the law. These regulations will direct more specifically how to execute the law at operational level. The drafting process involves other Ministries, including the Ministry of Finance. This inclusion is significant because a series of discussions at the national level, to which the World Agroforestry Centre provided expert advice, indicated that fiscal policy in Indonesia had not created sufficient enabling conditions for implementation of payments' schemes.

Is corporate social responsibility enough?

We argue that there are two points that need to be clarified if the regulations are to ensure transparent and smooth implementation.

First, the source of funds from companies that are beneficiaries of environmental services needs to be made clear. Currently, most of the Indonesian schemes feature State or quasi-State companies that have water as their core business, such as hydropower and drinking water companies, which, for example, pay upland farmers for reducing sedimentation in water supplies

Read further


Rainbow water
Atmospheric transport
Rainfall triggering conditions
Precipi-tation
Green water ET evapotranspiration
Precipi-tation
Green water ET evapotranspiration
Soil & ground-water buffering
Soil & ground-water buffering
Blue water streamflow
Blue water streamflow

Cool insights for a hot world: trees and forests recycle water

By Daisy Ouya 2/9/2017

Anyone who has walked outside on a sunny day knows that forests and trees matter for temperature, humidity and wind speed. Planting trees speaks to concerns about climate change, but the directly important aspects of the tree-climate relationships have so farbeen overlooked in climate policy where it relates to forest.

Water should become the primary motivation for growing and conserving trees.

That, at least, is the conclusion of a new review. The authors suggest that the global conversation on trees, forests and climate needs to be turned on its head: the direct effects via rainfall and cooling may be more important than the wellstudied effects through the global carbon balance. Yet, current climate policy only recognizes the latter. While farmers understand that trees cool their homes, livestock and crops, they had to learn the complex and abstract language of greenhouse gasses and carbon stocks if they wanted to be part of climate mitigation efforts. Not anymore, if the new perspectives become widely accepted.

In the review, published in the journal *Global Environmental Change*, the 22 authors provide examples for the planet-cooling benefits of trees.Scientists found evidence for the widespread perception that trees and forests also influence rainfall. As such, the review insists that water, and not carbon, should become the primary motivation for adding and preserving trees in landscapes.

"Carbon sequestration is a co-benefit of the precipitation-recycling and cooling power of trees. As trees process and redistribute water, they simultaneously cool planetary surfaces", says Dr David Ellison, lead author of the study.*Trees are giant air conditioners with no power bills.* "Some of the more refined details of how forests affect rainfall are still being discussed among scientists of different disciplines and backgrounds. But the direct relevance of trees and forests for protecting and intensifying the hydrologic cycle, associated cooling and the sharing of atmospheric moisture with downwind locations is beyond reasonable doubt."

Trees are giant air conditioners with no power bills. They use solar energy to convert water into vapour, thereby cooling their surroundings. On a hot day the surface temperature of a forest—in an example discussed in the paper—is similar to that of a nearby lake, while a dry patch of meadow or a tarmac road in the vicinity are more than 20 °C hotter. The cooling power equivalent is around 70 kWh for every 1 00 liter of water transpired, similar to the output of two home in conditioning units.

"There are important implications for practice, as we can no longer simply focus on carbon sequestration to mitigate or adapt to climate change", says Dr Victoria Gutierrez, Chief Science Officer of the WeForest NGO that supports forest landscape restoration efforts in tropical countries, and co-author of the study.

"For organizations and agencies working to restore forest ecosystems for climate and people, it is crucial that we pay greater attention to the sustainability of the water processing and cooling aspects of the trees."

Rainbow water

As they cool the planet, trees may also promote rainfall. Two ingredients for rainfall are: i) water vapour in the atmosphere to which trees and wetlands contribute importantly and in quantities that can be measured, and ii) a starting point for

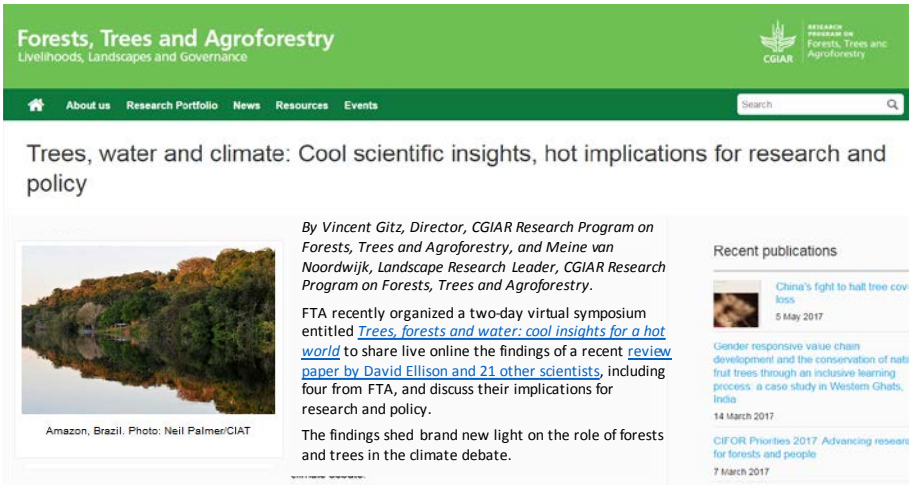
condensation of vapour into cloud droplets and rain drops. Trees are a source of volatile compounds that can become cloud condensation nuclei and trees are also a source of bacteria that form ice nuclei

Read further

- **Trees, forests and water: cool insights for a hot world**. *Global Environmental Change.* http://www.sciencedirect.com/science/article/pii/S0959378017300134
- Pricing rainbow, green, blue and grey water: tree cover and geopolitics of climatic teleconnections. *Current Opinion in Environmental Sustainability* 6:41-47.

Left to right: Meine van Noordwijk, Chief Science Advisor of the World Agroforestry Centre, and Vincent Gitz, Director of the CGIAR Programme on Forests, Trees and Agroforestry, talking with the audience in Bogor, Indonesia as part of the virtual symposium. Photo: World Agroforestry Centre/Riky Hilmansyah

Read further



Read further in:
http://foreststreesagroforestry.org/trees-water-and-climate-cool-scientific-insights-hot-implications-for-research-and-policy/

Bibliography AF2: papers with >5 citations/year

AF2: Biodiversity. Ecosystem services

- Biodiversity and ecosystem services in agricultural landscapes—are we asking the right questions? (2004) Agriculture, Ecosystems & Environment 104 (1), 113-134
- Global change and multi-species agroecosystems: concepts and issues (1998) Agriculture, Ecosystems and Environment 67: 1-22 67, 1-22
- Biodiversity and agricultural sustainagility: from assessment to adaptive management (2010) Current opinion in environmental sustainability 2 (1), 80-87
- Protected areas within multifunctional landscapes: Squeezing out intermediate land use intensities in the tropics? (2013) Land Use Policy 30 (1), 38-56
- Tree cover transitions and food security in Southeast Asia (2014) Global Food Security
- Biodiversity in rubber agroforests, carbon emissions, and rural livelihoods: an agent-based model of land-use dynamics in lowland Sumatra (2014) Environmental Modelling & Software 61, 151-165
- Environmental services and land use change in Southeast Asia: from recognition to regulation or reward? (2004) Agriculture, ecosystems & environment 104 (1), 229-244
- Forest–flood relation still tenuous–comment on 'Global evidence that deforestation amplifies flood risk and severity in the developing world' by CJA Bradshaw, NS Sodi, KS-H. Peh and BW Brook (2008) Global Change Biology 15 (1), 110-115
- Multipurpose agroforestry as a climate change resiliency option for farmers: an example of local adaptation in Vietnam (2013) Climatic change 117 (1-2), 241-257
- Segregate or integrate for multifunctionality and sustained change through landscape agroforestry involving rubber in Indonesia and China (2012) Agroforestry: The Future of Global Landuse
- Influence of coastal vegetation on the 2004 tsunami wave impact in west Aceh (2011) Proceedings of the National Academy of Sciences 108 (46), 18612-18617
- How trees and people can co-adapt to climate change: reducing vulnerability through multifunctional agroforestry landscapes (2011) World Agroforestry Centre (ICRAF), Nairobi 155

https://scholar.google.co.id/citations?user=CyTMe1IAAAAJ&hl=en

- Scaling trade-offs between crop productivity, carbon stocks and biodiversity in shifting cultivation landscape mosaics: the FALLOW model (2002) Ecological Modelling 149 (1), 113-126
- Constraints and opportunities for tree diversity management along the forest transition curve to achieve multifunctional agriculture (2014) Current Opinion in Environmental Sustainability 6, 54-60

AF2: Trees on farm, climate change mitigadaptation, water

- Climate change: linking adaptation and mitigation through agroforestry (2007) Mitigation and adaptation strategies for global change 12 (5), 901-918
- Climate change mitigation and adaptation in the land use sector: from complementarity to synergy (2014) Environ. Manage 54, 420-432
- Global tree cover and biomass carbon on agricultural land: The contribution of agroforestry to global and national carbon budgets (2016) Scientific Reports 6 (29987)
- Trees on farms: an update and reanalysis of agroforestry's global extent and socio-ecological characteristics (2014) Historical CO2 emissions from land use and land use change from the oil palm industry in Indonesia, Malaysia and Papua New Guinea
- Climate-Smart Landscapes: Multifunctionality In Practice. (2015) World Agroforestry Centre (ICRAF), Nairobi
- Negotiation support models for integrated natural resource management in tropical forest margins (2003) Integrated Natural Resource Management: Linking Productivity, the ...
- The effects of scales, flows and filters on property rights and collective action in watershed management (2002) Water policy 3 (6), 457-474
- APES: the agricultural production and externalities simulator (2009) Proceedings of the Conference on Integrated Assessment of Agriculture
- Participatory agroforestry development for restoring degraded sloping land in DPR Korea (2012) Agroforestry systems 85 (2), 291-303
- Quantifying off-site effects of land use change: filters, flows and fallacies (2004) Agriculture, Ecosystems & Environment 104 (1), 19-34
- Factors affecting soil loss at plot scale and sediment yield at catchment scale in a tropical volcanic agroforestry landscape (2010) Catena 80 (1), 34-46
- A systematic analysis of enabling conditions for synergy between climate change mitigation and adaptation measures in developing countries (2014) Environmental Science & Policy 42, 138-148
- If we cannot define it, we cannot save it: forest definitions and REDD. (2009) Policy Brief-ASB Partnership for the Tropical Forest Margins

https://scholar.google.co.id/citations?user=CyTMe1IAAAAJ&hl=en

AF2: Rewards for environmental services

- Compensation and rewards for environmental services in the developing world: framing pan-tropical analysis and comparison (2009) Ecology and Society 14 (2)
- Payments for environmental services: evolution toward efficient and fair incentives for multifunctional landscapes (2012) Annual Review of Environment and Resources 37, 389-420
- Fairly efficient, efficiently fair: Lessons from designing and testing payment schemes for ecosystem services in Asia (2015) Ecosystem Services 12, 16–28
- Principles for fairness and efficiency in enhancing environmental services in Asia: payments, compensation, or co-investment? (2010) Ecology and Society 15 (4)
- Can rewards for environmental services benefit the poor? Lessons from Asia (2009) International Journal of the Commons 3 (1), 82-107
- Towards operational payments for water ecosystem services in Tanzania: a case study from the Uluguru Mountains (2012) Oryx 46 (01), 34-44
- Stewardship Agreement to Reduce Emissions from Deforestation and Degradation (REDD): Case Study from Lubuk Beringin's Hutan Desa, Jambi Province, Sumatra, Indonesia (2010) International Forestry Review 12 (4), 349-360
- An introduction to the conceptual basis of RUPES: rewarding upland poor for the environmental services they provide (2004) ICRAF-Southeast Asia, Bogor, 46
- Criteria and indicators for ecosystem service reward and compensation mechanisms: realistic, voluntary, conditional and pro-poor (2007) Working Paper 37. Nairobi: World Agroforestry Centre
- Agroforest's growing role in reducing carbon losses from Jambi (Sumatra), Indonesia (2014) Regional Environmental Change 14 (2), 825-834
- Monitoring Air di Daerah Aliran Sungai (2009) ICRAF

AF2: REDD+ or REALU?

- Design challenges for achieving reduced emissions from deforestation and forest degradation through conservation: leveraging multiple paradigms at the tropical forest margins (2013) Land Use Policy 31, 61-70
- Benefit distribution across scales to reduce emissions from deforestation and forest degradation (REDD+) in Vietnam (2013) Land Use Policy 31, 48-60
- Community monitoring for REDD+: international promises and field realities (2013) Ecology and Society 18 (3)
- REDD+ Readiness progress across countries: time for reconsideration (2014) Climate policy 14 (6), 685-708

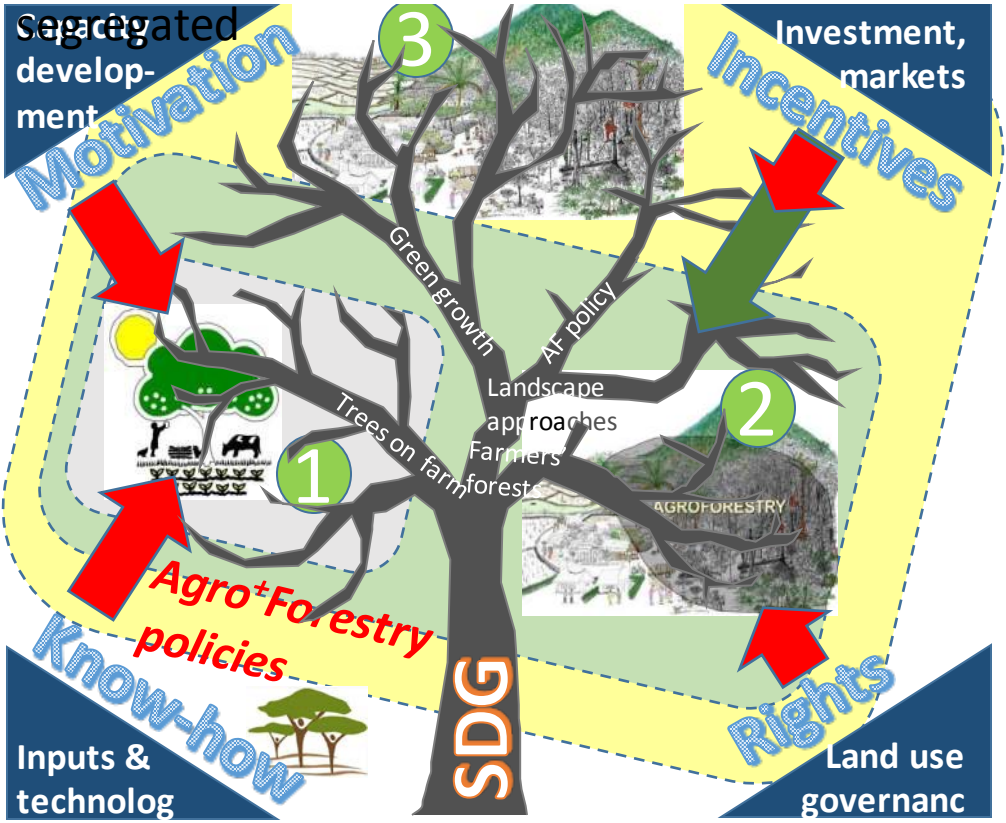
https://scholar.google.co.id/citations?user=CyTMe1IAAAAJ&hl=en

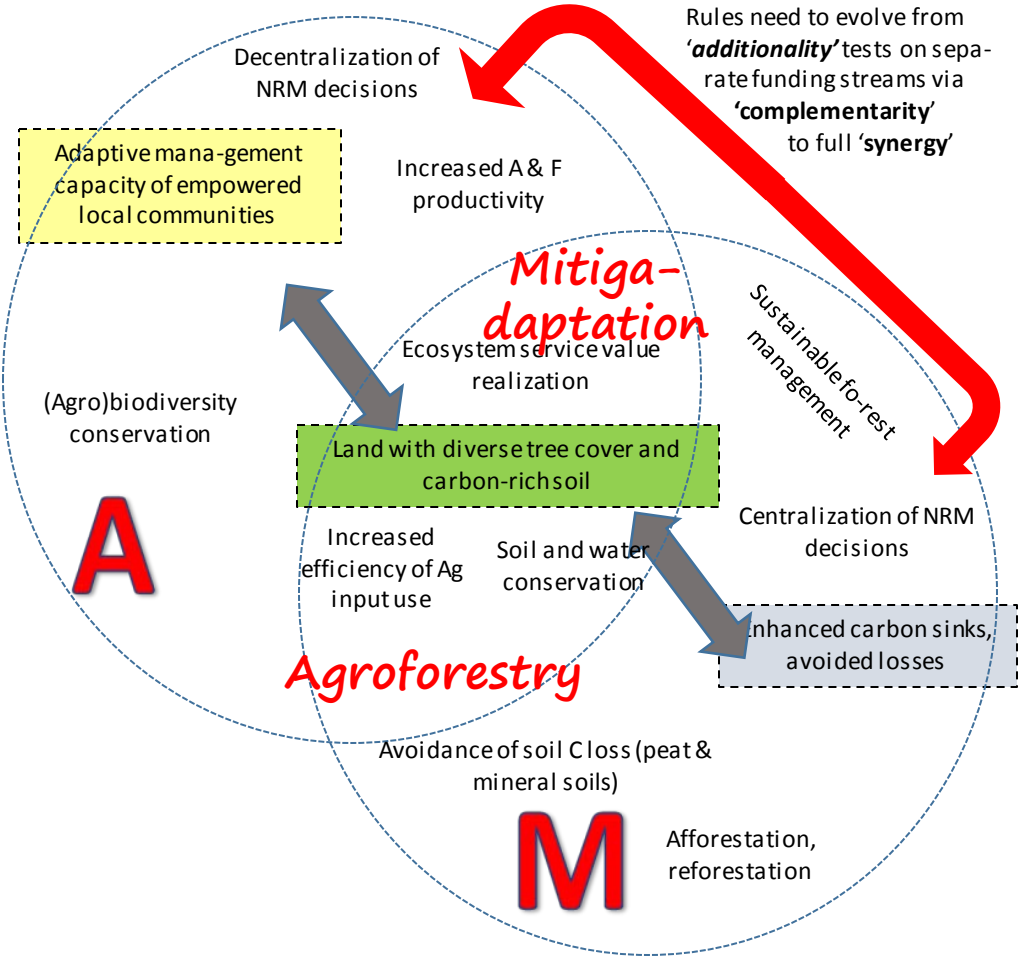
- Prospects for agroforestry in REDD+ landscapes in Africa (2014) Current opinion in environmental sustainability 6, 78-82
- Mitigating GHG emissions in the humid tropics: case studies from the Alternatives to Slash-and-Burn Program (ASB) (2004) Environment, Development and Sustainability 6 (1-2), 145-162
- Estimating the opportunity costs of REDD+– A training manual (2011) World Bank, Washington DC, USA
- Reducing emissions from land use in Indonesia: motivation, policy instruments and expected funding streams (2014) Mitigation and Adaptation Strategies for Global Change 19 (6), 677-692
- The forgotten D: challenges of addressing forest degradation in complex mosaic landscapes under REDD+ (2012) Geografisk Tidsskrift-Danish Journal of Geography 112 (1), 63-76
- Historical CO2 emissions from land use and land use change from the oil palm industry in Indonesia, Malaysia and Papua New Guinea (2013) Roundtable on Sustainable Palm Oil, Kuala Lumpur, Malaysia
- Co-investment paradigms as alternatives to payments for tree-based ecosystem services in Africa (2014) Current Opinion in Environmental Sustainability 6, 89-97
- Opportunities for REDD with Sustainable Benefits: An Interim Report by the ASB Partnership for the Tropical Forest Margins (2007) Nairobi: ASB Partnership for the Tropical Forest Margins
- Carbon stock assessment for a forest-to-coffee conversion landscape in Sumber-Jaya (Lampung, Indonesia): from allometric equations to land use change analysis (2002) Science in China
- Reform or reversal: the impact of REDD+ readiness on forest governance in Indonesia (2014) Climate Policy
- Community Monitoring of Carbon Stocks for REDD+: Does Accuracy and Cost Change over Time? (2014) Forests 5, 1834-1854
- Carbon sequestration and trace gas emissions in slash-and-burn and alternative land-uses in the humid tropics (1999) ASB Coordination Office, ICRAF
- Review of emission factors for assessment of CO2 emission from land use change to oil palm in Southeast Asia (2013) Tree shape plasticity in relation to crown exposure
- Will funding to Reduce Emissions from Deforestation and (forest) Degradation (REDD+) stop conversion of peat swamps to oil palm in orangutan habitat in Tripa in Aceh, Indonesia? (2014) Mitigation and Adaptation Strategies for Global Change 19 (6), 693-714
- Implications of uncertainty and scale in carbon emission estimates on locally appropriate designs to reduce emissions from deforestation and degradation (REDD+) (2014) Mitigation and Adaptation Strategies for Global Change 19

https://scholar.google.co.id/citations?user=CyTMe1IAAAAJ&hl=en

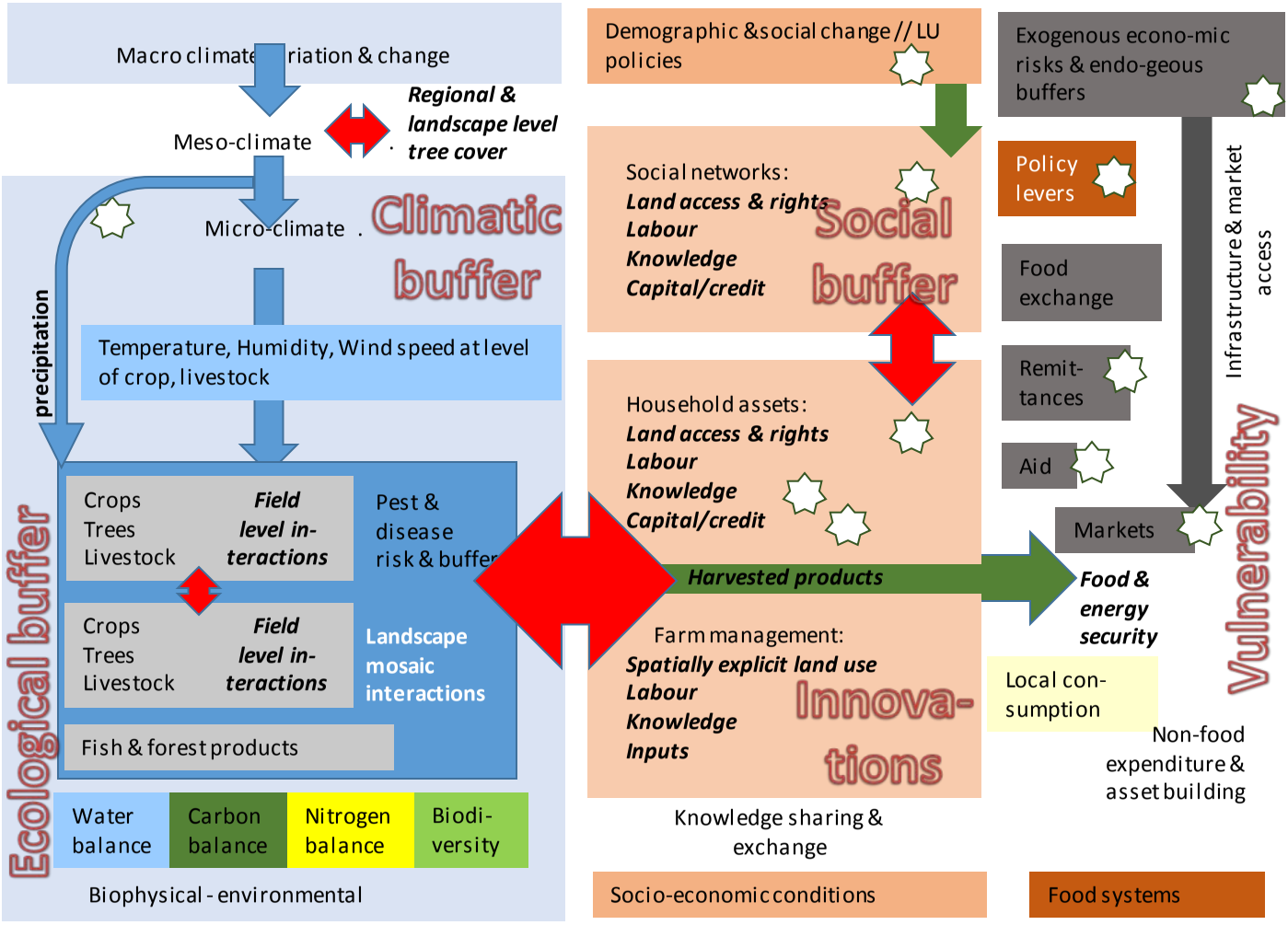
Section 3.

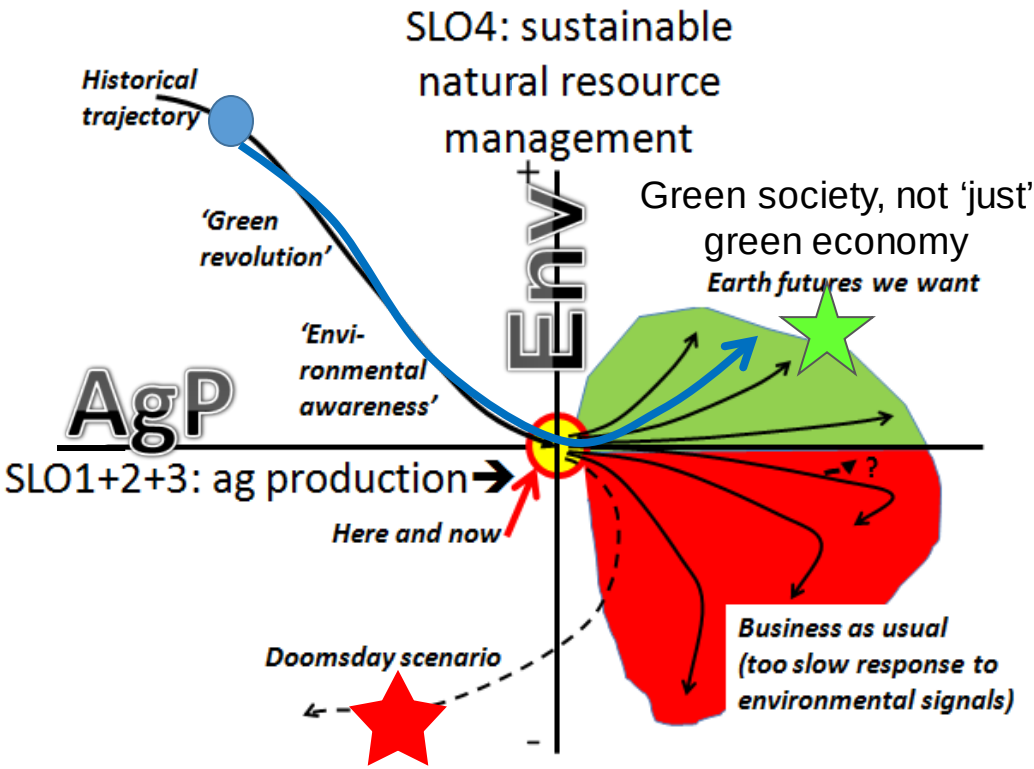
A further step is the ‘agro-plus-forestry’ concept of all interactions and interfaces, offering integration where policies got segregated

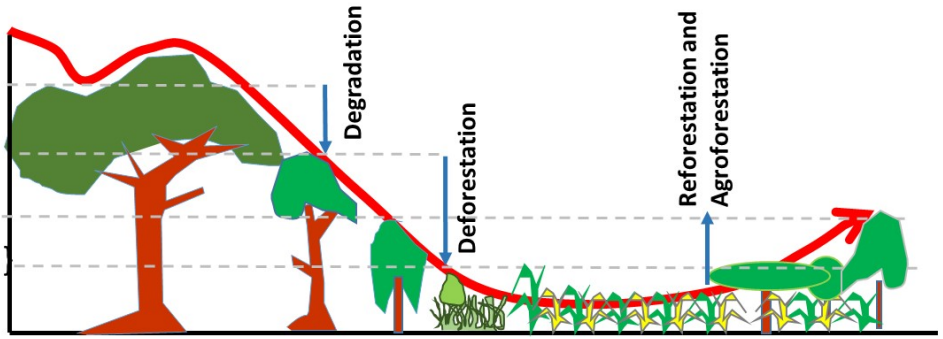




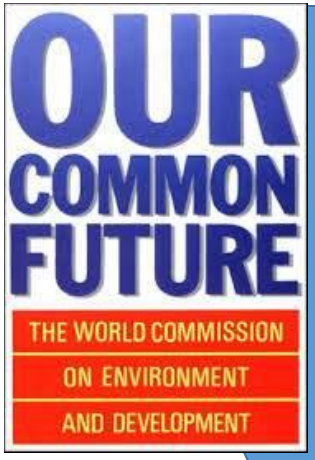
Climate change mitigation and adaptation in the land use sector: from complementarity to synergy (2014). Environmental Management 54 (3), 420-432


Macro climate variation & change
Meso-climate
Regional & landscape level tree cover
Micro-climate
Climatic buffer
precipitation
Temperature, Humidity, Wind speed at level of crop, livestock
Crops
Trees
Livestock
Field level in-teractions
Pest & disease risk & buffer
Crops
Trees
Livestock
Field level in-teractions
Landscape mosaic interactions
Fish & forest products
Ecological buffer
Water balance
Carbon balance
Nitrogen balance
Biodi-versity
Biophysical - environmental
Demographic & social change // LU policies
Social networks:
Land access & rights
Labour
Knowledge
Capital/credit
Social buffer
Household assets:
Land access & rights
Labour
Knowledge
Capital/credit
Harvested products
Farm management:
Spatially explicit land use
Labour
Knowledge
Inputs
Innova-tions
Knowledge sharing & exchange
Socio-economic conditions
Exogenous econo-mic risks & endo-geous buffers
Policy levers
Food exchange
Remit-tances
Aid
Markets
Infrastructure & market access
Food & energy security
Local con-sumption
Non-food expenditure & asset building
Vulnerability
Food systems


SLO4: sustainable natural resource management
Historical trajectory
'Green revolution'
'Envi-ronmental awareness'
Env
+
-
AgP
SLO1+2+3: ag production
Here and now
Green society, not 'just' green economy
Earth futures we want
?
Business as usual (too slow response to environmental signals)
Doomsday scenario


Degradation
Deforestation
Reforestation and Agroforestation


Planetary boundaries
Biodiversity
Atmosphere & air quality
Oceans
Land use: tree cover
transitions, intensification
Climate, hydrological cycle
Nutrient cycles, pollution
Livelihoods
Demography
Well-being
Footprint
Life-styles
Accountability
Equitability
Income & daily needs:
Subsistence
Market-based
Wage-based
Asset-based
Sustainable
Transforming lives
Development
& landscapes
Goals
Sustainable development
Forest
Forest-edge
Rural
Peri-urban
Urban
Metropolitan
Landscapes & trees
Commitment
Goals
Targets
Performance metrics
Investment
Governance
Identity, rights
Respect, humanity
Education
Health
Clean water, sanitation
Food & nutrition
Security
Basic needs



1987

30 years ago

Separate Rio conventions

1992

Safeguards

United Nations Framework Convention on Climate Change

Cobenefits

Every step in UNFCCC has to deal with "cobenefits" and "safeguards"

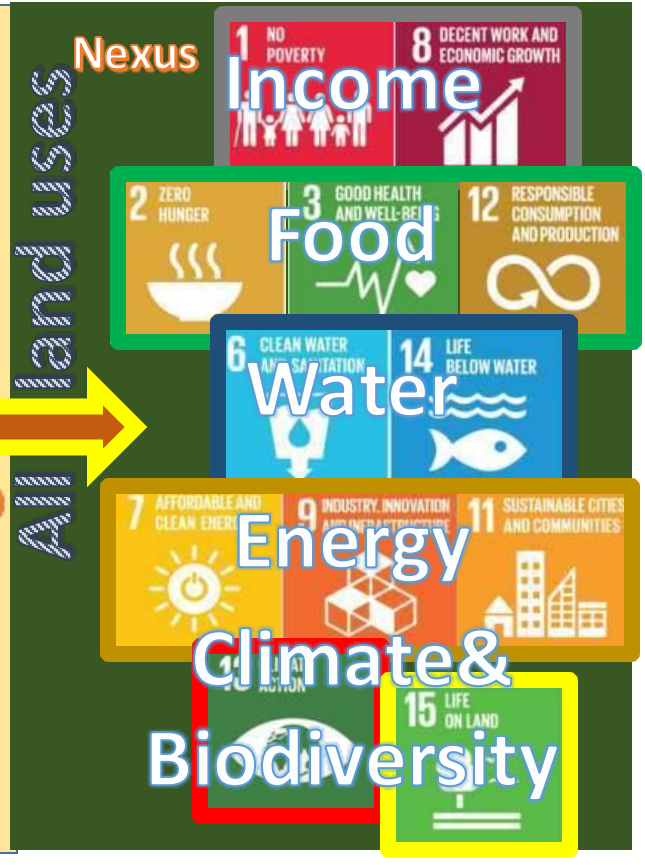
UN agenda 2030: 17 Sustainable Development Goals, adopted in 2015

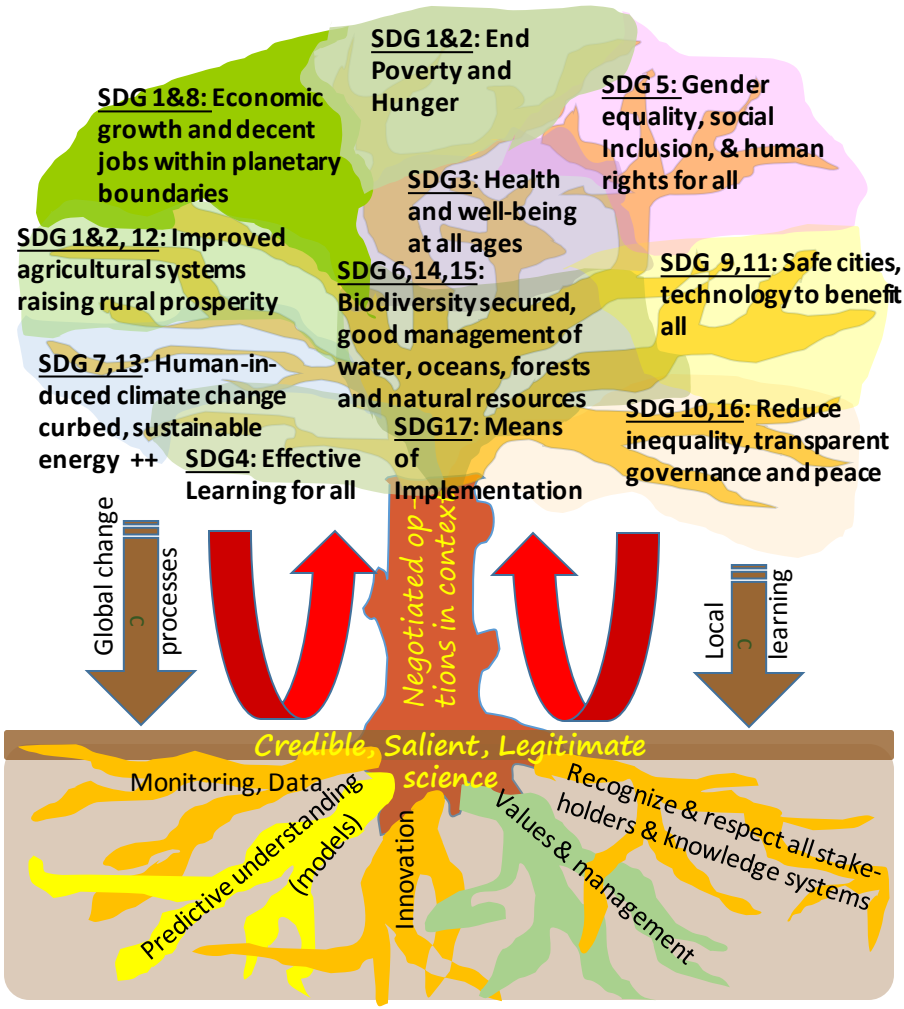
Fairness + efficiency

Enabling

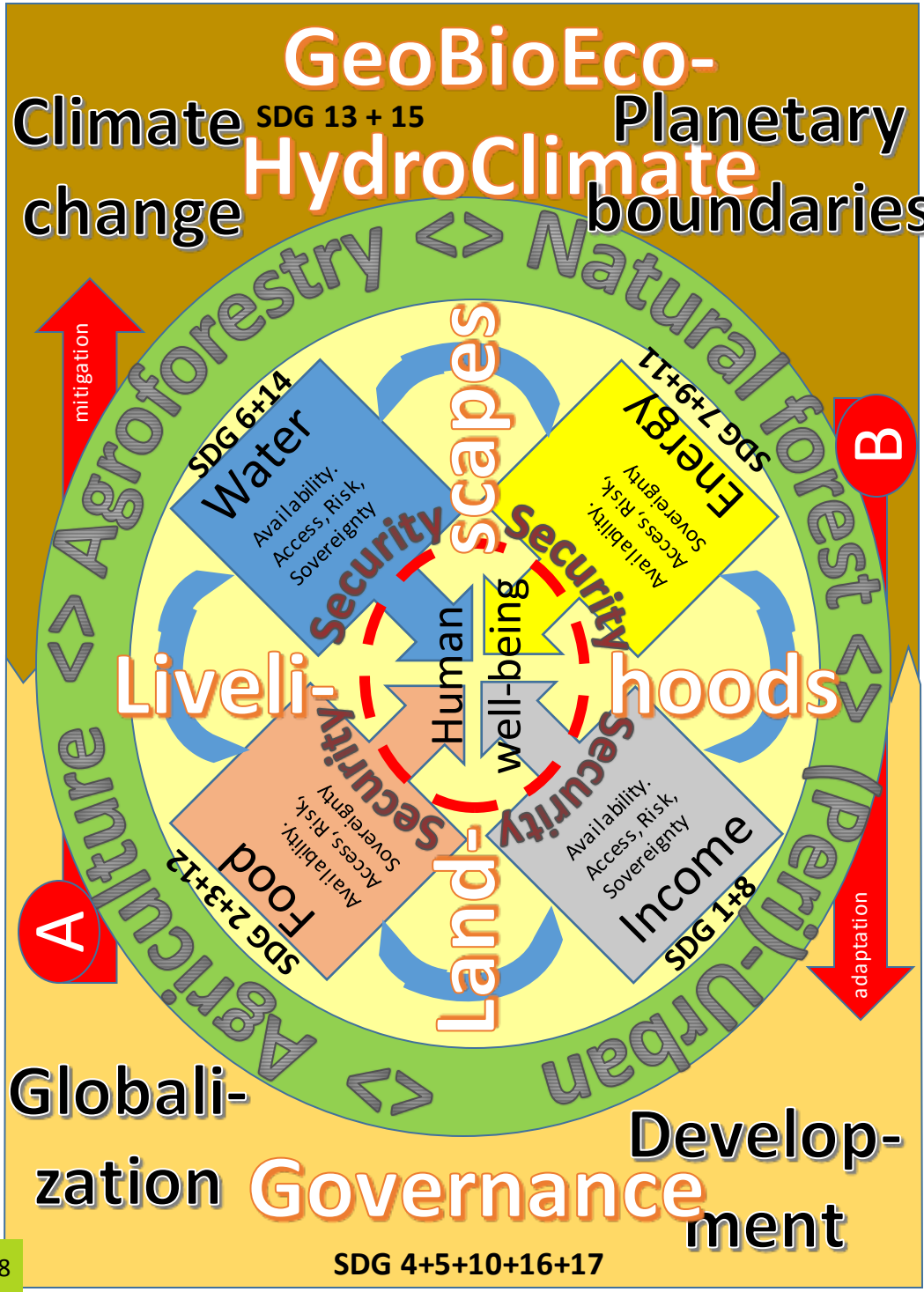
All land uses

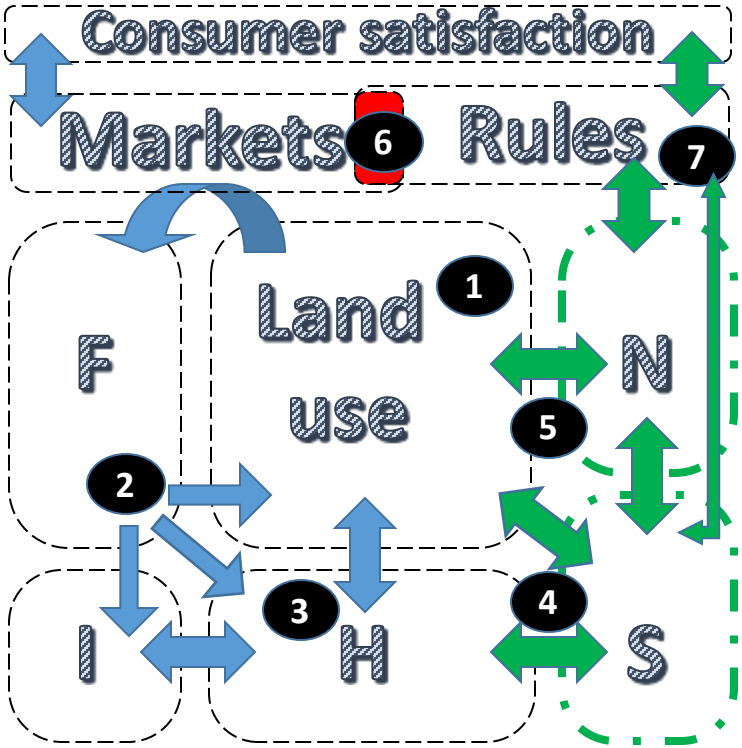
Nexus





Tree-based theories of change

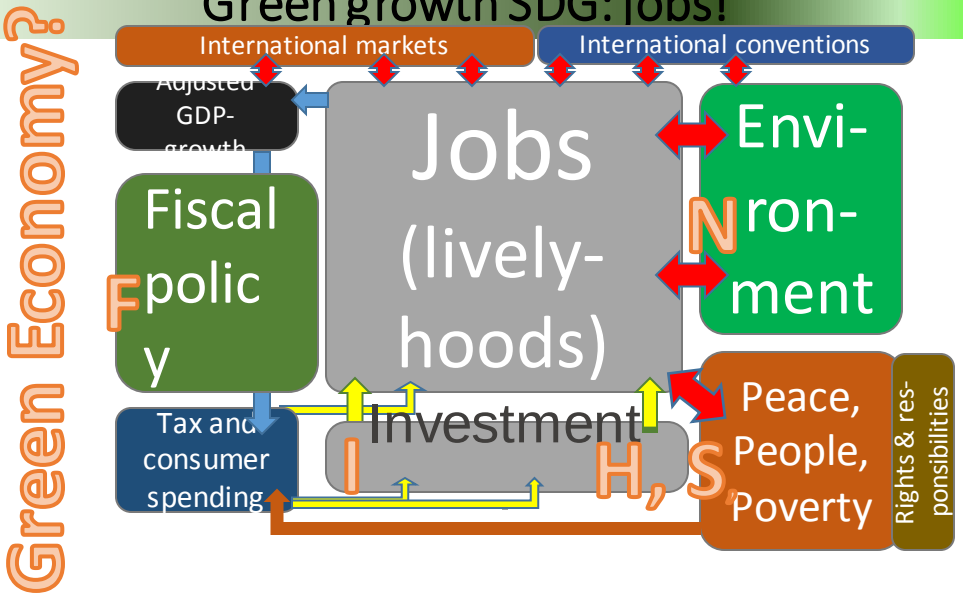

GeoBioEco-
Climate
SDG 13 + 15
HydroClimate
Planetary
change
boundaries
Agroforestry <> Natural forest <> (Peri)-Urban
Agriculture <>
mitigation
adaptation
A
B
SDG 6+14
Water
Availability.
Access, Risk,
Sovereignty
SDG 7+9+11
Energy
Availability.
Access, Risk,
Sovereignty
Security
Security
Land-scapes
Human well-being
Liveli-hoods
Security
Security
Food
Availability.
Access, Risk,
Sovereignty
SDG 2+3+12
Income
Availability.
Access, Risk,
Sovereignty
SDG 1+8
Globali-zation
Governance
Develop-ment
SDG 4+5+10+16+17



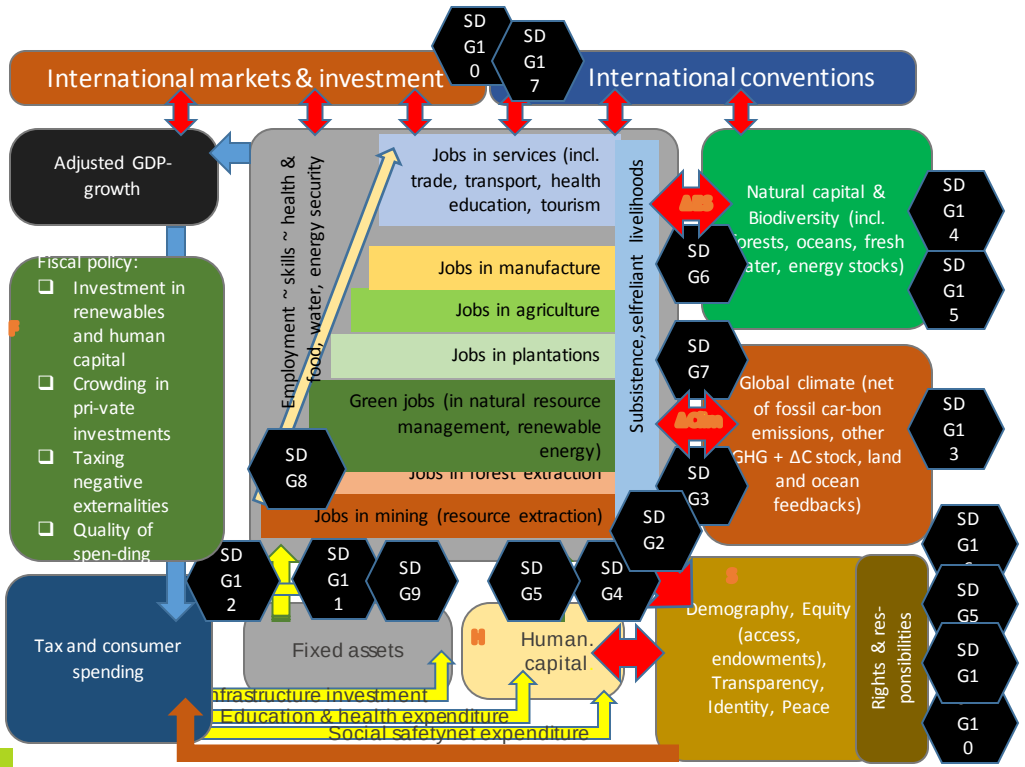
Seven elements where 'green economy ' policies go beyond mainstream business-as-usual investment in land use change:

1. Land use planning, access rights, enforcement of compliance,
2. Control over investment (e.g. using tax and subsidy instruments), making investors accountable for social and environmental impact of the land use they support,
3. Support for human capital, capacity (skills, knowledge, values) development, technological innovation,
4. Recognition of and support for community-level institutions, free and prior informed consent and empowerment of local governance systems,
5. Acknowledged dependence of human wellbeing and land productivity on ecosystem services, supporting maintenance and recovery of natural capital,
6. Ecocertification as proof of compliance with rulesets specified,
7. Revision and reform of rules based on evidence of effects on N, S, H, I and F.

Green growth SDG: jobs!

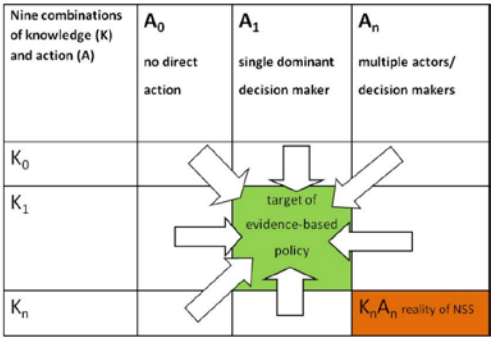


Basic model of a national economy with policy leverage domains



Evidence-based-policy-based-evidence on forests, trees and agroforestry

By Rob Finlayson 11 /7/2012



The Centre's chief science advisor argues that researchers need to address more complex issues of policy and evidence if they want to have a real impact. Interest in *evidence-based policy* alternates with periods where *policy-based evidence* dominates. However, it is naive to expect that the former can exist in isolation. Historically, efforts to compile and augment evidence have been carried out and/or been paid for by those who accumulated wealth and power. The evidence available is thus coloured and not neutral.

Existing evidence on 'forest' is based on a long tradition of distinguishing 'forest' (F) from 'non-forests' (NF). Properties of at least some members of the F class are supposed to represent all, and can be contrasted with those of at least some members of the NF class. The difference may be taken as 'evidence' for the continued policy relevance of F.

However, there are many types of F, many types of NF and at least some NF matches at least some properties of the 'ideotype' of F (for example, agroforests that match the biodiversity of natural forests); also, at least some F matches at least some properties of the ideotype of NF (for example, plantation forestry as opposed to tree–crop agriculture). The existence of a difference in mean between F and NF cannot, in that case, be used as evidence for categorical policy decisions regarding F and NF. Rather, we may progress faster by using more detailed classification in the F–NF continuum, figure out which properties matter for policies and compile evidence accordingly.

The 'forest' versus' non-forest' distinction exists in two quite separate realms: 1) an ecological/biophysical one where the degree of dominance of woody perennials in vegetation is associated with many properties, ecosystem functions and services; and 2) a social/political/institutional one where forests were distinguished from village lands and put under the control of a local lord or king, a role later taken over by government.

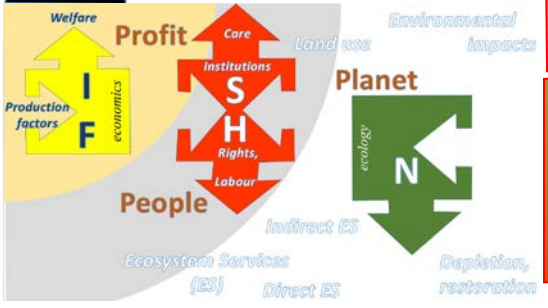
There is evidence for both types of F–NF distinctions, but it isn't always clean and clear which is which. Government-reported F data, for example, as a basis for global forest assessments, have been marred by inconsistencies of interpretation. Trees outside forest sometimes occur in dense stands that would be, based on biophysical criteria, classified as F; but they are not under the institutional control of F agencies, and their stakeholders/managers want to keep it that way.

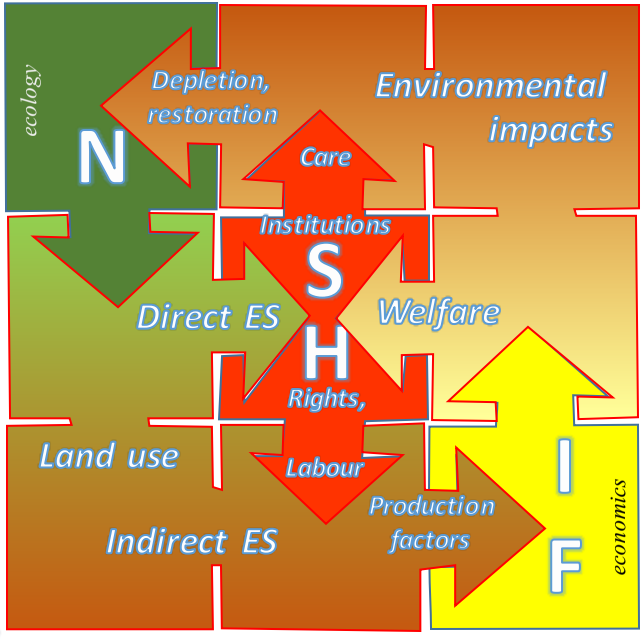
Agroforestry exists on the F–NF interface of both the ecological/biophysical and the social/political/institutional perspectives. Rather than carving out an agroforestry niche that has boundaries to worry about with both the F and the NF worlds, we should be concerned by the disfunctionality of the F–NF dichotomy and argue for a more evidence-based approach to the ways landscapes (with a mosaic of F and NF elements, plus agroforestry) function, what this means for all stakeholders and for the way decisions are made. Once we understand the current complexity, entry points for change from the status quo can be identified and coalitions formed to influence change. More than a decade ago this approach was termed Negotiation Support Systems and has gradually found traction[1].

Read further

- Negotiation support models for integrated natural resource management in tropical forest margins. Conservation Ecology 5(2): 21. Available from http://www.consecol.org/vol5/iss2/art21.
- Linking scientific knowledge with policy action in natural 2/3 resource management. ASB Policy Brief 19. Nairobi: ASB Partnership for the Tropical Forest Margins.
- Boundary work for sustainable development: natural resource management at the Consultative Group on International Agricultural Research (CGIAR). Proceedings of the National Academy of Sciences . doi:10.1073/pnas.0900231108.

The inter-/trans-disciplinarity issue:





Gender Equality or Environmental Conservation? A tough call for Sumatra

Rebecca Selvarajah 8/22/2013

Greater involvement of women in landscape-level decision-making will increase emissions from deforestation and forest degradation in Sumatra, Indonesia, posing challenges to emissions reduction efforts. This is according to a study by Villamor et al, published in 'Mitigation and Adaptation Strategies for Global Change', which revealed that support for greater gender equality in decision-making may not coincide with environmental goals in the area, and a tough choice may have to be made between objectives—gender equality or environmental conservation?

Indonesia has experienced massive land conversion fromforest to intensive commercial agriculture, and has one ofthe highest rates of deforestation among tropicalcountries. This leads to a decrease in terrestrial carbon stocks, higher carbon emissions, a loss of biodiversity and changes to hydrological functions. Women in the agricultural communities of Sumatra are rarely invited to participate in decision making at the village level. Men and women are ascribed different roles in agricultural activity, as regulated by local customary law or adat. Some communities practice a matrilineal kinship system, where land is bequeathed from mother to daughters or nieces. This leads to strong land rights for women, egalitarian ethics, and a relative absence of gender discrimination. In upland rubber fields, the traditional matrilineal system has been replaced by a modified system in which land is bequeathed from father to son. This has strengthened the land rights of men, while eroding women's land rights.

Liberalization and globalization mean that people's land use choices are increasingly based on options and influences originating outside their communities—with major implications for transitions to sustainability. The drivers of deforestation have changed from small-scale farming to industrial-scale, export-oriented agricultural production, such as oil palm and rubber monoculture. Efforts to Reduce Emissions from Deforestation and Degradation (REDD+) must address the drivers of these conversion processes. Does gender affect decision-making and practical choices in relation to land use change? Do men and women respond in the same way to new land use opportunities that may affect carbon emissions? This type of gender analysis has not been adequately studied to date.

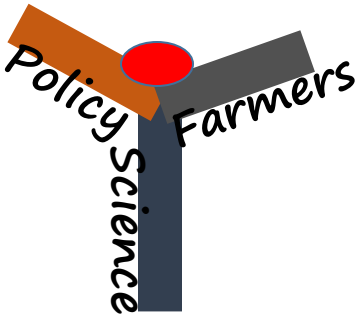
Villamor et al undertook a study to examine the role of gender as a factor in decisions about land use change in a forest margin landscape in Jambi (Sumatra, Indonesia). It explored three dimensional variables that can affect the diversity of responses between females and males: the elevation gradient (lowland versus upland); individuals and group responses; and the level of conservation awareness. A survey was conducted and role playing games assessed participant responses in a simulated social setting of women-only and men-only groups. Six villages were selected across a stratification based on elevation (lowland and upland) and the degree of previous involvement in conservation boundary work undertaken by the World Agroforestry Centre and its partners. Exploring the drivers and consequences of forest transition is key focus of the CGIAR's Collaborative Research Project 6 on Trees, Forests and Agroforestry —of which the Centre is a key partner.

Read further

T - Shaped skills

Generalist breadth +
Specialist depth

WAGENINGEN UR
For quality of life



Skilled interlocutors of three knowledge systems

World Agroforestry Centre

CAPRi Collective Action and Property Rights
a CGIAR program led by IFPRI

HOME ▪ NEWS ▪ PUBLICATIONS ▪ WORKSHOPS AND EVENTS ▪ CAPRI BLOG ▪ PARTNERS ▪ CONTACT US

CAPRi Blog: Tragedy of the "Common But Differentiated Responsibilities" Resolved, But Is the Principle Applied Consistently?

January 4, 2016

In this blog, Meine van Noordwijk from World Agroforestry Centre (ICRAF), discusses the concept of 'Common but Differentiated Responsibilities' (CBDR) in recent international negotiations.

"The real tragedy of the commons is that people believe collective action cannot effectively defend common interests", with words similar to that Ruth Meinzen-Dick opened a session on commons and property rights at the global landscapes forum in Paris early December.

A few kilometers away from that forum international climate negotiators were struggling with another type of commons: the 'common but differentiated responsibilities' that is central to the UNFCCC climate convention, but proved to be contentious in many years of negotiation. In 1992, the catch phrase, 'common but differentiated responsibilities' (CBDR), became part of

LATEST NEWS

EMPLOYMENT:Senior Land Rights Researcher at IIED

PUBLICATION: Finding Common Ground

TRAINING: Governance of Landscapes, Forests and People

BOOK: Eating, Drinking, Surviving

EMPLOYMENT: Consultant on Land Rights at UNCCD

CAPRI BLOGS

CAPRi Blog: Indicators of Gendered Control over Agricultural Resources

CAPRi Blog: Rooted in Equality, Gender and REDD+ Roadmaps Pave the Way for Enhancing Women's Participation in the Forestry Sector

CAPRi Blog: Grazing Game: A Learning Tool For Adaptive Management In Response To Climate Variability In Semi-Arid Areas Of Ghana

FEATURED THEME

CAPRi's work on Climate change

Collective Action and Property Rights

Read further in:
http://capri.cgiar.org/2016/01/04/blog-tragedy-of-the-common-but-differentiated-responsibilities-resolved-but-is-the-principle-applied-consistently/

Bibliography AF3: papers with >5 citations/year

AF3: Linking knowledge with action, SDG's

- Boundary work for sustainable development: Natural resource management at the Consultative Group on International Agricultural Research (CGIAR). (2011) Proceedings of the National Academy of Sciences of the United States of America
- Agroforestry solutions to address food security and climate change challenges in Africa (2014) Current Opinion in Environmental Sustainability 6, 61-67
- Social-ecological and regional adaptation of agrobiodiversity management across a global set of research regions (2012) Global environmental change 22 (3), 623-639
- Agricultural intensification, deforestation, and the environment: assessing tradeoffs in Sumatra, Indonesia (2001) Tradeoffs or synergies?: agricultural intensification, economic development ...
- Agricultural development with rainforest conservation: methods for seeking best bet alternatives to slash-and-burn, with applications to Brazil and Indonesia (1998) Agricultural Economics 19 (1), 159-174
- Environmental benefits and sustainable land-use options in the Jambi transect, Sumatra (2002) Journal of Vegetation Science 13 (3), 429-438
- Toward a general theory of boundary work: insights from the CGIAR's natural resource management programs (2010) Agroforestry for livelihood enhancement and enterprise development

AF3: Social differentiation

- Migrants, land markets and carbon emissions in Jambi, Indonesia: land tenure change and the prospect of emission reduction (2014) Mitigation and Adaptation Strategies for Global Change 19 (6), 715-732
- Gender differences in land-use decisions: shaping multifunctional landscapes? (2014) Current Opinion in Environmental Sustainability 6, 128-133
- Gender influences decisions to change land use practices in the tropical forest margins of Jambi, Indonesia (2014) Mitigation and Adaptation Strategies for Global Change 19 (6), 733-756
- Social Role-Play Games Vs Individual Perceptions of Conservation and PES Agreements for Maintaining Rubber Agroforests in Jambi (Sumatra), Indonesia (2011) Ecology and Society 16
- Hot spots of confusion: contested policies and competing carbon claims in the peatlands of Central Kalimantan, Indonesia (2011) International Forestry Review 13 (4), 431-441

https://scholar.google.co.id/citations?user=CyTMe1IAAAAJ&hl=en

AF3: Interacting with global hydrological cycle

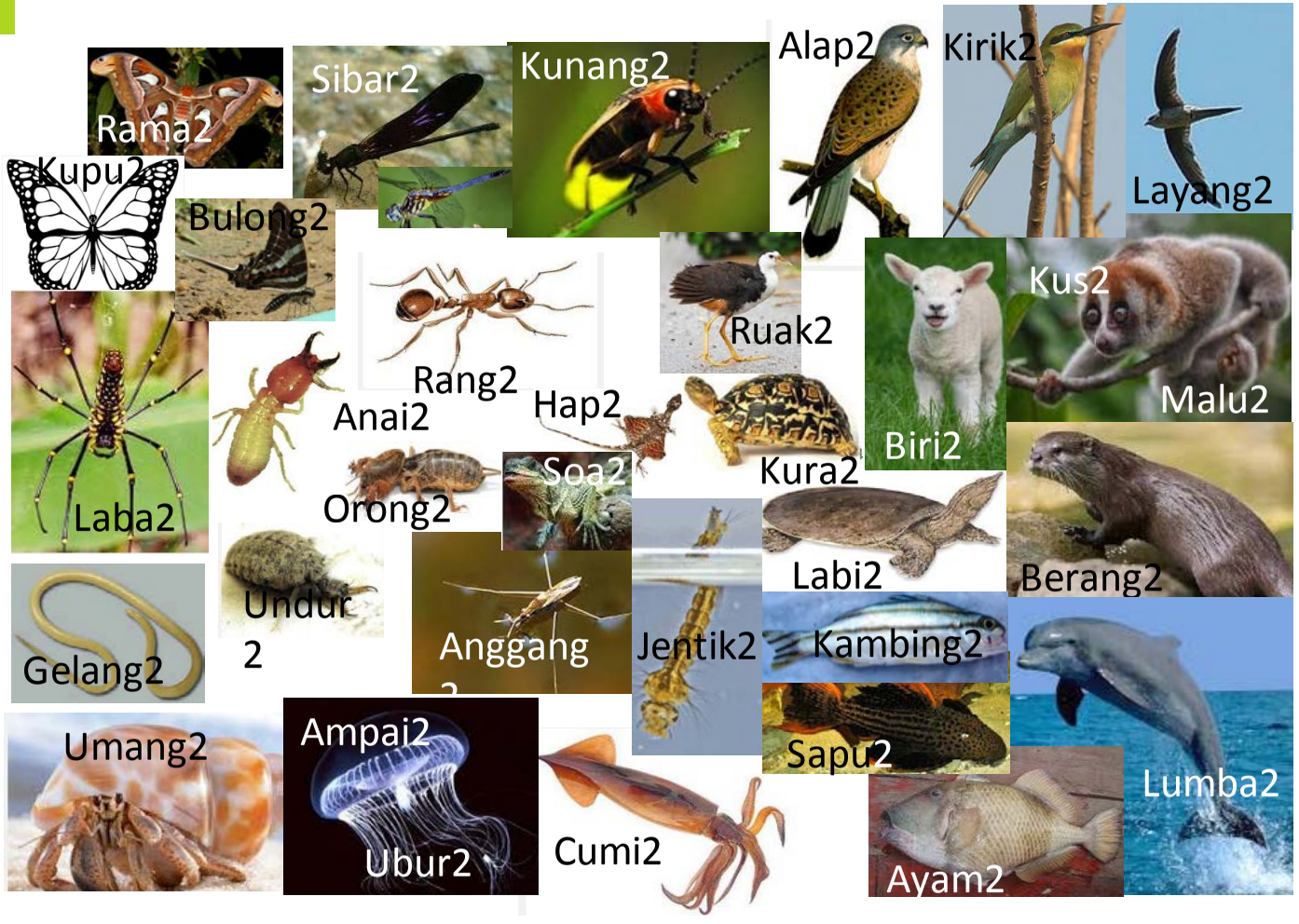
- ❑ Pricing rainbow, green, blue and grey water: tree cover and geopolitics of climatic teleconnections (2014) Current Opinion in Environmental Sustainability 6, 41-47
- ❑ Knowledge gaps and research needs concerning agroforestry's contribution to sustainable development goals in Africa (2014) Current Opinion in Environmental Sustainability 6, 162-170
- ❑ Attribution of climate change, vegetation restoration, and engineering measures to the reduction of suspended sediment in the Kejie catchment, southwest China (2014) Hydrology and Earth System Sciences 18 (5), 1979
- ❑ Localizing demand and supply of environmental services: interactions with property rights, collective action and the welfare of the poor (2006) Policy analysis and environmental problems at different scales: Asking the right questions
- ❑ Spatial and temporal variation in rainfall erosivity in a Himalayan watershed (2014) Catena 121, 248-259

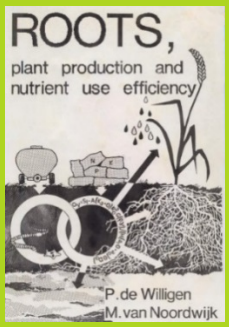
Three agroforestry paradigms:
http://www.worldagroforestry.org/downloads/Publications/PDFS/WP16079.pdf

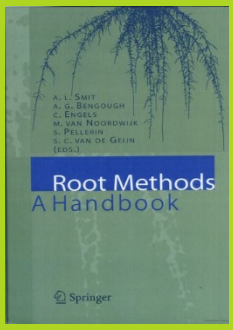
Soils research in agroforestry:
http://www.worldagroforestry.org/downloads/Publications/PDFS/WP15023.pdf.

Work in progress on PES:
http://www.worldagroforestry.org/sd/environmental-services/PES

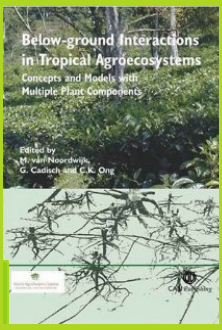
https://scholar.google.co.id/citations?user=CyTMe1IAAAAJ&hl=en

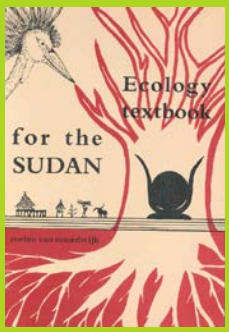



ROOTS,
plant production and nutrient use efficiency
P.de Willigen
M.van Noordwijk

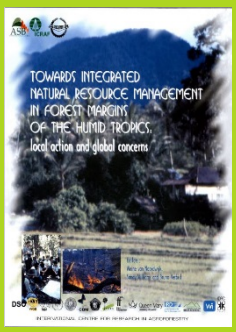

A. L. Smit
A. G. Bengough
C. Engels
M. van Noordwijk
S. Pellerin
S. C. van de Geijn
(eds.)
Root Methods
A Handbook
Springer

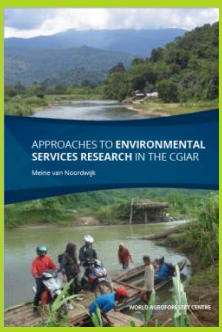

WaNuLCAS

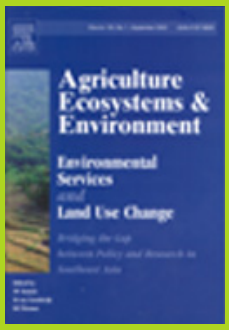

Below-ground Interactions in Tropical Agroecosystems
Concepts and Models with Multiple Plant Components
Edited by
M. van Noordwijk
G. Cadisch and C.K. Ong

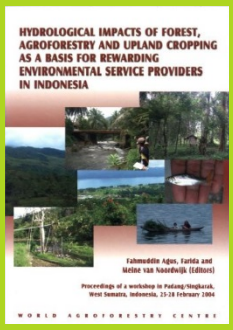

Ecology textbook
for the SUDAN
meine van noordwijk

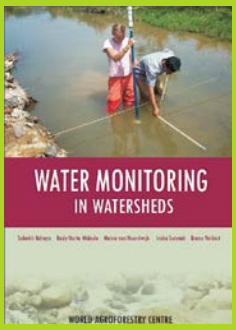

Modelling and measuring soil organic matter dynamics and greenhouse gas emissions after forest conversion
Report of workshop/ training course
9-15 August 1996, Bogor/Muara Sabo
Indonesia
Edited by:
Daniel Murdiyarso
Kurniatun Hairiah
Meine van Noordwijk


TOWARDS INTEGRATED NATURAL RESOURCE MANAGEMENT IN FOREST MARGINS OF THE HUMID TROPICS: local action and global concerns

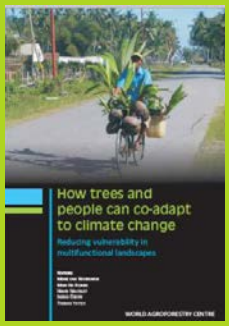

APPROACHES TO ENVIRONMENTAL SERVICES RESEARCH IN THE CGIAR
Meine van Noordwijk
WORLD AGROFORESTRY CENTRE

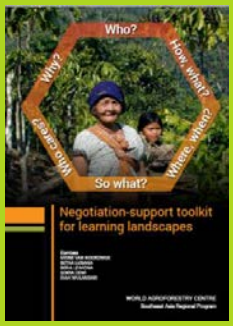

Agriculture Ecosystems & Environment
Environmental Services
and
Land Use Change

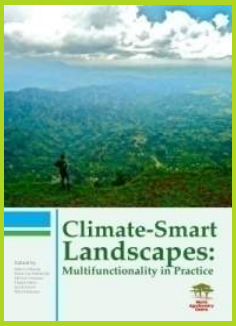

HYDROLOGICAL IMPACTS OF FOREST, AGROFORESTRY AND UPLAND CROPPING AS A BASIS FOR REWARDING ENVIRONMENTAL SERVICE PROVIDERS IN INDONESIA
Fahmuddin Agus, Farida and Meine van Noordwijk (Editors)
Proceedings of a workshop in Padang/Singkarak, West Sumatra, Indonesia, 25-28 February 2004
WORLD AGROFORESTRY CENTRE

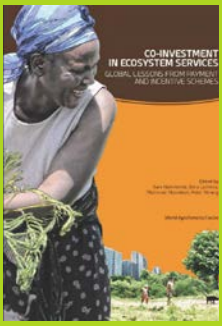

WATER MONITORING IN WATERSHEDS
WORLD AGROFORESTRY CENTRE


Partnership in the Tropical Forest Margins
a 20-Year Journey in Search of Alternatives to Slash-and-Burn


How trees and people can co-adapt to climate change
Reducing vulnerability in multifunctional landscapes
WORLD AGROFORESTRY CENTRE


Who?
How, what?
Where, when?
So what?
Why?
Negotiation-support toolkit for learning landscapes
WORLD AGROFORESTRY CENTRE


Climate-Smart Landscapes:
Multifunctionality in Practice


CO-INVESTMENT IN ECOSYSTEM SERVICES

"Twenty-five years ago, in 1992, the foundation was laid for the Southeast Asia program of ICRAF, the World Agroforestry Centre. As one of the last of the pioneer generation, it is with mixed feelings that I enter the 'alumni' group: nostalgia for all the companions on our journey of discovery, pride for the times and places where our teams could make a difference in proposing new ideas, reducing conflict and supporting the basis of sustainagility, and gratefulness for the partnership that transformed not only lives and landscapes, but also ourselves."

This 'bunga rampai', or collection of wildflowers picked up along the way in our travels through the landscape of 'kebun lindung' is a compilation of the visual memes that emerged as 'grams', and some of the words that coalesced in 'blogs'. These are arranged according to the three concepts of agroforestry that took shape during our journey: the plot and farm scale, the landscape as social-ecological system, and the integrated land use – sustainable development goals arena.

World Agroforestry Centre