

# TULSEA

<b>Project title:</b>	Trees in Multi-Use Landscapes in Southeast Asia
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<b>Location:</b>	China, Indonesia, Lao DPR, Philippines, Thailand and Viet Nam
<b>Partners:</b>	Various in each country
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## Background

Many areas rich in natural resources are correspondingly attractive to a range of people, not only to those who live in the area. The management of those natural resources can only be successful if conflict between the various interests is avoided.

Accordingly, the World Agroforestry Centre, in partnership with the German Federal Ministry of Economic Cooperation and Development and the Deutsche Gesellschaft für Technische Zusammenarbeit, set out to develop a range of methods ('tools') that can be applied to a range of potential conflict scenarios associated with natural resources in Southeast Asia.

Since 2007, we have worked closely with farmers, government agencies, universities and non-government organizations in six countries to create or improve a number of tools, databases and computer models that can give solid scientific knowledge to farmers and others to help inform discussions and clarify contentious issues.

## Tools

- Participatory Landscape Appraisal (PaLA)
- Participatory Analysis of Poverty, Livelihoods and Environment Dynamics (PAPOLD)
- Rapid Appraisal of Drivers of Land-Use Change (DriLUC)
- Rapid Agroforestry systems & technology (RAFT)
- Rapid Marketing Appraisal (RMA)



**Figure 1.** TULSEA test site locations

- Rapid Hydrological Appraisal (RHA)
- Rapid Landslide Mitigation Appraisal (RaLMA)
- Rapid Carbon Stock Appraisal (RaCSA)
- Rapid Oxygen Supply Appraisal (ROSA)
- Rapid Agro-Biodiversity Appraisal (RABA)
- Quick Biodiversity Survey (QBS)
- Rapid Tenurial Assessment (RaTA)
- Barrier Analysis for Tree Enhancement (WNoTree)
- Fair and Efficient REDD Value Chains Allocation (FERVA)
- Analysis of Land Use and Cover Trajectory (ALUCT)
- Biofuel Emission Reduction Estimator Scheme (BERES)
- REDD/REALU Site-level Feasibility Appraisal (RESFA)

## Databases

- Agroforestry tree
- Seed supply
- Wood density

## Models

- Functional Branch Analysis (FBA)
- Water, Nutrient and Light Capture in Agroforestry Systems (WaNuLCAS)
- Spatially Explicit Individual-based Forest Simulator (SEI-FS)
- Generic River Flow (GenRiver)
- Forest, Agroforest, Low-value Landscape or Wasteland? (FALLOW)
- Local Ecological Knowledge (LEK)
- Indicator of watershed quality (FlowPer = Flow Persistence)

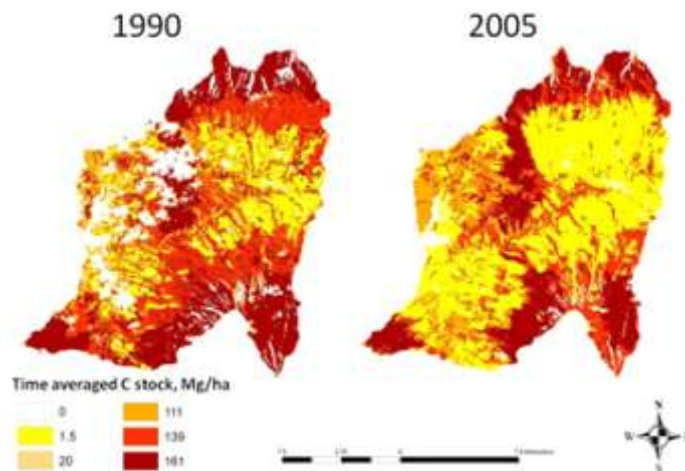
The development of the tools, models and databases listed above has involved 19 sites in six countries (10 in Indonesia, 3 in The Philippines, 1 in Thailand and 5 in Viet Nam), 15 training sessions with nearly 300 participants and more than 49 publications (flyers, posters, books, journal articles, chapters, manuals, newsletters, audio-visuals).

## Example of use

A combined team from the Faculty of Agriculture, University of Brawijaya, Malang, and the World Agroforestry Centre's Indonesia program used the RaCSA method to estimate carbon-stock changes in the Kalikonto Watershed, Malang.

Extrapolation of carbon stock at plot through to watershed levels was done by multiplying the area of each land cover type with its time-averaged aboveground carbon stock.

Over 15 years, carbon lost for the whole watershed was estimated to be 25 924 t/ha, equivalent to a yearly carbon loss of 1.48 t/ha. Carbon lost from natural forest was about 1.09 t/ha/yr, tree plantations lost 0.25 t/ha/yr. Carbon lost from coffee-based agroforestry systems was



**Figure 2.** Distribution of carbon density in Kalikonto sub-watershed in 1990 and 2005

relatively small, about 0.05 t/ha/yr. Increasing the area of annual crops in 2005 lead to a small gaining of carbon stock in the landscape was about 0.03 t/ha/yr but the carbon lost from the landscape exceeded this gain.

After use of the RaCSA method, the team concluded that planting more trees (damar, pinus, mahogany) in the landscape through the Reforestation Program of the Forest Estate (PERHUTANI) in the 1990–2005 period was not able to reduce the carbon lost from the landscape. Planting more trees in the landscape in agroforests and plantations may compensate for the lost of carbon through forest conversion.

## What is left to do?

In 2011, we will be reviewing and writing a synthesis of the tools to develop ideas for follow-up activities. These are likely to be useful within any REDD+ or other carbon schemes and can also be applied to a range of other situations.