Basic Forest Restoration Research in the Philippines

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Outline

- **Philippines' Involvement in AKECOP Research and Capacity Building**

  - Regional research

  -On-site Korea-Phil. collaborative research

- **Key Research Highlights**: objectives; findings; and practical applications
- **Significant Outputs / Accomplis**hments

AKECOP Regional Research

Phase	Duration	Theme/Program
Phase I	2000 - 2005	Philippines-Korea program on forest restoration, agroforestry and biodiversity **(13 research studies)**
Phase II	2005 - 2008	Forest restoration for poverty alleviation and environmental quality amelioration in the Philippines **(7 research studies)**
Phase III	2008 - 2011	Restoration of Degraded Terrestrial and Mangrove Forest Ecosystems in ASEAN Region **(1 regional research partnership with Phils, Thailand & Vietnam; cross-country visit; national forest assessment)**

Continuation…

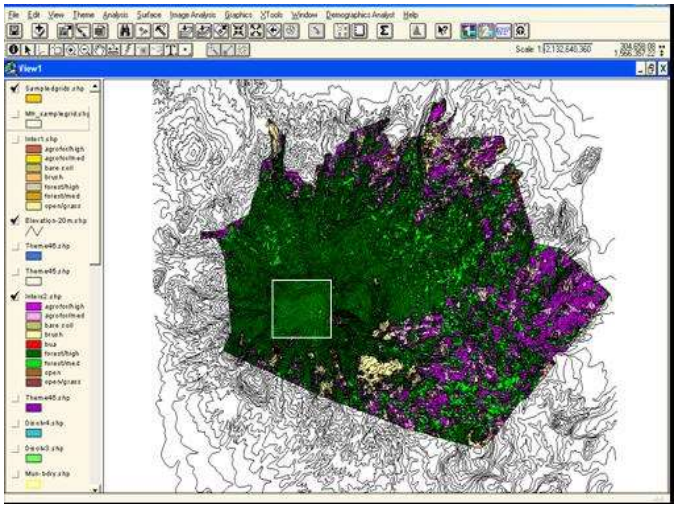
Phase	Duration	Theme
Phase IV	2011 - 2012	Costs & benefits of carbon sequestration in mangrove forests in Bohol, Philippines
Phase V	2012-2013	Refining the economic valuation model for mangrove ecosystems in Bohol, Philippines
Phase VI	2013 - 2015	Policy analysis of AKECOP-Philippines Phase I-V regional and on-site researches in the Phils; Policy & program changes in forest restoration and rehabilitation in the Phils: Research results review and policy assessment of AKECOP's regional and on-site researches

Research Highlights:

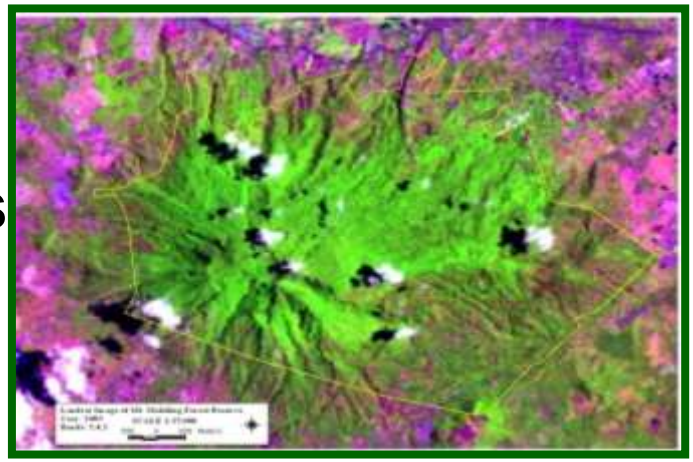
Objectives:

- RS/GIS-based decision-support system for monitoring and managing land use in watershed ecosystem
- An ecophysiologically-based decision support system for improved species selection scheme in tree plantations
- Appropriate soil management regimes for coconut-based and multi-storey agroforestry systems
- Participatory model for the assessment of socio-economic and environmental benefits of mangrove forest ecosystem

Research area: RS/GIS-based decision-support system



- **Thematic maps and statistics** of land use change in Cambantoc Watershed
- **Biodiversity grid monitoring** system
- Maps and statistics of **priority areas** for agroforestry development



Research area: Water-use efficiency of plantation species

- List of water-use efficient species (*e.g. Parashorea malaanonan, Diospyros philippinensis, Vitex parviflora, Shorea contorta, S. almon, Gmelina arborea, Acacia mangium, etc.*) and "water-use less efficient" (*Pterocarpus indicus, Bischofia javanica*)
- Map showing best sites for selected planted species in Mt. Makiling

Research area: coconut-based agroforestry systems

- **Soil resources impact** of coconut-based and other multi-storey agroforestry systems
- **Water-use efficiency** of perennial tree species (*e.g.* *Gmelina arborea* + coffee, *S. macrophylla*) in coconut-based agroforestry systems
- **Cost-benefit assessment** of coconut-based agroforestry systems (all of the crop combinations showed a positive BCR and ROI , using 15% and 20% IR)

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Research area: Mangrove ecosystems management

- Valuation of mangrove forest restoration benefits
- Forest restoration benefits assessment model
- Criteria and indicators for sustainable mangrove forest restoration and management

Direct Use Value:
USD 1,237 / ha / yr

Carbon Stock:
USD 723 /ha /yr
Thrice larger than the upland forest.

Significant Outputs of AKECOP-Philippines

•Publication of **nine (9) books**

•Publication of AKECOP-Philippines research outputs in the Forest Science & Technology Journal, the Journal of Environmental Science & Management, E&D Journal, *etc.* (ISI/Non-ISI Journals)

- About **twenty (~20) articles** published

•AKECOP-Philippines Bulletin: A bi-annual official news publication of AKECOP-Phil.

- International Short-Term Training Course conducted: **Five (5)**

- Papers presented (from outputs of researches) in conferences, workshops, fora (local and international): About **forty (~40)**

AKECOP-Philippines Regional Research Team has been awarded:

- the “Most Outstanding Research Team” in CFNR (2006 and 2014)
- the “Most Outstanding Research Team” in UPLB (2007 and 2015)

Collaborative On-site Research

STUDY SITES:

Researches at the La Mesa Watershed are made possible through a Memorandum of Agreement (MOA) with ABS-CBN Bantay Kalikasan, Inc.

La Mesa Watershed in the Province of Rizal

Makiling Forest Reserve, UPLB-CFNR

Year	On-Site Research Title	Research Sites
2001-2008	Restoration of degraded forest and development of agroforestry techniques by local people's participation	Mt. Makiling, CFNR, UPLB La Mesa Watershed
2003-2005	Biodiversity and genetic resources of plant species in tropical forests	Mt. Makiling, CFNR, UPLB
2005-2011	Conservation of plant biodiversity in tropical forests	Mt. Makiling, CFNR, UPLB Palawan Butuan-Surigao Baguio-Cordillera Mountains Subic-Zambales Gyungsangnam-do, Korea
2008-2011	Ecological restoration research in the Philippines	Mt. Makiling, CFNR, UPLB

Research area: Biodiversity and genetic resources of plant species in tropical forests

• GIS database design for Mt. Makiling biodiversity has been developed .

•Database contains information on species, soils, slope, aspect, elevation and land uses

•DNA marking of *Parashorea malaanonan* for ex-situ conservation

Research area: Restoration of degraded forest and development of agroforestry techniques

•Adequate information on the bio-physical characteristics (*i.e.* climate, hydrology, soil, *etc*.), biodiversity, and socio-economic conditions (in La Mesa & Mt. Makiling) prevailing have been generated, analyzed and processed.

•Restoration strategies/agroforestry technologies such as ANR, FTAS and NT-CSS which are deemed appropriate to the varying conditions of degraded forests.

Research area: Ecophysiology of plantation species

- Net photosynthesis, photosynthetic nitrogen and water use efficiency were higher in *A. mangium* than *A. auriculiformis* and *P. indicus.*
- *A. mangium* showed better physiological attributes, which could be important features for species to be used for rehabilitating degraded areas of the country.

Key collaborative Research Outputs

Creative research partnership and **collaboration** among Filipino scientists and researchers of varied but related fields; and between Filipino scientists and their Korean counterparts.

Significant Outputs On-site Collaborative Research

- **Publication of five (5) books**

- **Publication research outputs in the ISI Journals**
  - **Ten (10) articles published**

Journal Publications

Authors	Article Title	Journal/Volume	Year Published
Yong-Kwon Lee & Su-Young Woo	Changes in litter decomposition, nitrogen mineralization and microclimate in *Acacia mangium* and *Acacia auriculiformis* plantation in Mt. Makiling, Phils	International Journal of Physical Sciences 7(12): 1976-1985	2012
A.R. Han, J.E. Sohng, J.R. Barile, D.K. Lee, P.S. Park, Y.K. Lee, &S.Y. Woo,	Comparison of Soil Seed Banks in Canopy Gap and Closed Canopy Areas between a Secondary Natural Forest and a Big Leaf Mahogany (*Swietenia macrophylla* King) Plantation in the Mt. Makiling Forest Reserve, Phils	Journal of Environmental Science and Management 15:47-59	2012
S.R. Han, S.Y. Woo, D.K. Lee	Carbon storage and flux in aboveground vegetation and soil of sixty-year old secondary natural forest and large leafed mahogany (*Swietenia macrophylla* King) plantation in Mt. Makiling, Phils	Asia Life Sciences 19(2): 357-372	2010
E.R.G. Abraham, L.A. Castillo, Y.K. Lee, & A Luna	Conservation relay: Private sector participation in restoration of degraded forest landscape in Mt. Makiling, Phils	Forest Science & Technology 3: 33-39	2007

Authors	Article Title	Journal/Volume	Year Published
Y.K. Lee, D.K. Lee, S.Y. Woo, & C.H. Park	Differences of tree species composition and microclimate between a mahogany (*Swietenia macrophylla* king) plantation and a secondary forest in Mt. Makiling, Philippines	Forest Science & Technology 2(1): 1-12	2006
Lee, Y. K., D. K. Lee, S. Y. Woo, P. S. Park, Y. H. Jang, & E. R. G. Abraham	Effect of Acacia plantations on net photosynthesis, tree species composition, soil enzyme activities, and microclimate on Mt. Makiling	Photosynthetica 44(2): 299-308	2006
Combalicer, M.S., Lee, D.K., Woo, S.Y., Lee, Y.K. & Jang, Y.H.	Early Growth and Physiological Performances of Tree Species Planted in La Mesa Watershed, Phils	Phil Agricultural Scientists Journal 88 (3): 305 – 316	2005
Lee, D.K., Lee, Y.K., Woo, S.Y., Bae, K.H., Choung, Y.S., Cho, D.S., Jang, Y.H. & Combalicer, M.S.	Seedling Growth and Composition of Tree Species at Mt. Makiling Los Baños in the Philippines	Journal of Korean Forestry Society 145-148	2003

Human capacity building: Degree programs and thesis grants sponsored by AKECOP awarded to AKECOP-Philippines members

Recipient	Duration	Degree Program/ Title of Thesis	University
Dr. Marilyn Sabalvaro-Combalicer	2001-2003	*Masters Degree*/ Early growth and physiological characteristics of plant species in La Mesa Watershed, Philippines	Seoul National University, Seoul, South Korea
Dr. Portia G. Lapitan	2001-2004	*Dissertation Research Grant*/ Mating System and Genetic Diversity of Parashorea malaanonan (M. Blanco) Merr. in Mt. Makiling, Laguna, Philippines	Seoul National University, Seoul, South Korea
Dr. Dixon T. Gevaña	February 2014	*Dissertation Research Grant*/ Developing Carbon Management Strategies for Mangrove Forests in Banacon, Island Bohol	Seoul National University, Seoul, South Korea
Ms. Maricel A. Tapia	April 2011	*MS Thesis Grant*/ Vulnerability and Adaptation to Climate Change of Selected CBFM Communities in the Municipality of Oas, Albay, Philippines	University of the Philippines Los Baños

Thank You!

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