X. STABILITY OF RAIN FOREST MARGIN AREAS IN CENTRAL SULAWESI, INDONESIA (STORMA)

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The German Research Council (DFG) supports an extensive interdisciplinary research programme to be implemented in the area of the Lore Lindu National Park, Central Sulawesi. The first phase of the programme is scheduled for 3 years (July 2000–June 2003). Up to four successive phases of 3 years' duration each may follow, depending on the outcome and success of the current phase.

The programme comprises 5 subprogrammes with altogether 17 projects, each involving at least one doctoral student from Germany. The students from Germany will be matched by Indonesian doctoral students wherever possible within the framework of the Indonesian and German systems of scientific promotion, involving scholarships, supervision, university development schemes.

Implementing universities are Institut Pertanian Bogor (IPB), Java, and Universitas Tadulako (UNTAD), Palu, Sulawesi, both Indonesia, and Georg-August-Universität Göttingen (GAUG) as well as Universität Gesamthochschule Kassel (UghK), both Germany.

Project C-2 'Structural and functional plant diversity of different land use systems' within the subprogramme C 'Biodiversity' focuses on the characterisation of plant community structures of natural forest, forest gardens, agroforestry systems, and annual cultures. Key research questions include:

1) How do different land use systems differ in plant diversity? Which land use systems have the least influence on plant diversity as compared with the natural forest?
2) Which biotic and abiotic factors explain changes in plant biodiversity best?
3) Which keystone species can be identified in respect to biotic interactions and matter turnover?

To answer these questions we will:

1) Determine the structural plant diversity of important land use systems (alpha-, beta-, and gamma-diversity). In the first phase of the project we will focus on terrestrial plants, epiphytes being studied in a later phase of the project.
2) On the basis of phenological observations and ecophysiological measurements we will categorise functional plant diversity (trees) of the land use systems into different life strategy types and determine the importance of these types in the different ecosystems. Functional plant diversity analysis focuses on physiognomic plant type, phenology, photosynthetic pathways and capacities, leaf water turnover, nutrient economy, and rate of leaf herbivory.

The results of the interdisciplinary approach proposed here, integrating data on plant systematics and ecology, may help developing effective and scientifically sound regimes for sustainable use and management of the various land use systems, with conservation of the greatest possible variety of biological species and maintenance of their important ecological functions. All questions will be closely studied with subprogramme A 'Social and Economic Dynamics', subprogramme B 'Water and Nutrient turnover' and subprogramme D 'Land use systems'. Within the project the Herbarium Celebense at Tadulako will be established and developed to international standards.

Leaders of the project are Prof. Dr. S.R. Gradstein, Prof. Dr. C. Leuschner and Dr. D. Hölscher, all from Göttingen, counterparts are Dr. Sri S. Tjitrosoedirdjo and Dr. Soekisman Tjitrosemito (both IPB). Executing researchers at Lore Lindu National Park are Dr. J. Mogea (IPB/BO), Mr. Ramadhanil and Mr. A. Tanra Tellu (UNTAD), K. Bohman (GAUG), and Dr. P.J.A. Keßler (L).

During the preparatory phase a checklist of higher plants has been prepared using data from different literature sources. Additionally c. 1500 specimens of L from Sulawesi have been entered into the BRAHMS database including the following families: Annonaceae, Capparaceae, Casuarinaceae, Euphorbiaceae, Fagaceae, Lauraceae, Magnoliaceae, Monimiaceae, Moraceae, Myristicaceae, Pandanaceae, Pittosporaceae, Proteaceae, Rosaceae, Saxifragaceae, Ulmaceae, Urticaceae, and Winteraceae.

Recent fieldwork by Keßler on structural plant diversity included the establishing of a 1 ha plot at Gunung Potong (near Tongoa/Kamarora), at about 1000 m elevation, and of 4 plots (50 × 50 m) at forest gardens at Kamarora at about 750 m elevation. Two 20 × 20 m plots in fallows have been established in Watumaeta. Basic plot data are e.g. diameter of trees, estimated height, location within the plot, and provisional scientific names. Some 250 fertile plant collections have been obtained which will be dried and distributed in a later stage. A training course was given on tree climbing, plot establishment, and herbarium management for STORMA members and UNTAD students. A building for the Herbarium Celebense has been allocated by the board of the University and has been equipped with an electrical drying stove, racks, herbarium boxes, deep freezer, and other furniture. Basic books (Flora Malesiana, Flora of Java, etc.), tree climbing equipment, and all other material (GPS, altimeter, compass, scissors) needed for proper collecting botanical specimens is available. However, part of the building should be sealed and air conditioned in order to preserve the valuable collection. This operation will hopefully be completed before the end of this year. Mr. Ramadhanil has been appointed as the scientific head and two technicians are responsible for the proper management of the collection.

Field work on functional plant diversity, conducted by K. Bohman, has focused on leaf morphology of about 80 tree specimens collected by a randomised sampling scheme in the 1 ha natural forest plot of Gunung Potong. The samples were taken exclusively from sun canopy branches by the tree climbing technique in order to be representative for the rain forest canopy environment. Among the parameters investigated are leaf size, leaf diameters, leaf thickness, specific leaf area, stomatal density, leaf nutrient concentrations, epidermal surface properties, and others.

Comparable investigations are recently conducted in the woody fallows near Watumaeta and Wuasa where pioneer tree species dominate. Physiological studies (including leaf conductance and photosynthesis measurements) will be conducted on a subsample of these tree species.

Dr. J. Mogea (IPB/BO) visited Lore Lindu National Park for two weeks in 2001 and established some transects in order to study the palm vegetation at different altitudes.

We invite all interested institutions collecting in Sulawesi to exchange duplicate plant material in order to create a regional centre of biodiversity information.

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