C）のマイコリザに関しては、モミガラくん炭を利用した苗畑における苗木へのマイコリザの実用的な接種法を確立させた。マイコリザの人工感染によって苗木の成長が促進されることを確認した。これらの成果は、1993年９月にジョクジャカルタで開催された国際シンポジウム(Bio-Refor)で発表し、日本の学会誌にも投稿中である。また、インドネシア国内でも問い合わせが多く、普及用パンフレットの作成、林業関係の会員誌への掲載など、成果の普及も進められている。また、ＡＩＣＡＦの農林地一体開発調査でもモミガラくん炭が利用され、農業省でもモミガラくん炭利用によるマイコリザの接種法のセミナーが開催される予定があるなど、林業以外の分野からも大きな反響を得ている。1994年度の研究課題申請でも、マイコリザに関連した多くの研究課題が出されている。

＜問題点と今後の方向＞挿

フタバガキ科樹木は結実が不定期であり、また種子の保存が現時点では非常に困難なことから、苗木を大量に、安定的に供給するためには、挿し木や組織培養などの無性繁殖による育苗技術の確立が必要である。しかしながら、現在はこの分野の研究者が、留学などの理由により非常に不足している状態にある。

マイコリザの感染による成長促進に関しては、マイコリザの感染の有無による苗木の生理的な違いを明らかにすることが重要であり、そのことが育苗技術や造林技術の発展につながると考えられる。

【第４分野：分野間研究】

第１項　実験林の造成

目　　的　更新技術、マイコリザ接種苗などを利用した実験林の造成によって、フタバガキ科樹種の造林法に関するより実際的な研究の活性を高める。

研究課題　A）更新過程を利用した森林造成法に関する研究

B）マイコリザを利用した熱帯地域の各種造林法に関する研究

＜活動と進捗状況＞

A）の森林造成法に関しては、ブキットスハルト演習林内につくられた展示林や造林方法試験地（ラインプランティングを実施）などの植栽試験地を対象に、これまで日本人専門家とインドネシア側カウンターパートとが共同で測定したデータをもとに、立地環境と植栽木の成長の解析がインドネシア側カウンターパートによってまとめられつつある。これらの成果は、今後の解析に資することもあって、生データがＰＵＳＲＥＨＵＴの年報に掲載されている。

B）のマイコリザの利用に関しては、モミガラくん炭を用いた実際の植林地におけ

る実用的人工感染法をおおむね確立した。感染木での成長促進が確認された。現在、インドネシア側カウンターパートによる追試が行われている。

＜問題点と今後の方向＞

今後、植栽試験地を密度管理などの育林技術の研究に使用するためには、面積が狭すぎるきらいがある。さらに植栽地を増やしていくことが必要である。また、第Ⅱフェーズ終了まであと半年となり、演習林の維持管理、調査データの管理などを徐々にインドネシア側へ移行させていく必要がある。その意味からも、インドネシア側カウンターパートよる調査データの整理解析を通して、試験研究の目的や手法を理解してもらうことが重要である。

表23　インドネシア側研究者による研究論文一覧

I＝INDONESIAN
E＝ENGLISH

Year-No.	Authors		Title
1986- 1	Daniel Murdiyarso	E	・Microclimatological studies in East Kalimantan; A report based on the visit to the Experimental Forest Stations of PUSREHUT in collaboration with JICA.
1986- 2	Mahmud A. Raimadoya	I	・Deteksi perubahan land-cover hutan 1986-1987 ・Forest land cover change detection 1986-1987.
1986- 3	Ripto Permono	E	・Phenology and seed technology of dipterocarp forest tree species.
1986- 4	FX. Dwisutanto	I	・Percobaan pembiakan vegetatip dari beberapa jenis famili Dipterocarpaceae dengan cara cangkokan dan stek. ・Vegetative propagation of some Dipterocarps by air layering and stem cutting.
1986- 5	Risman Situmeang Dhani Ispandiar Shigeru Takahata	I	・Aplikasi tehnik penginderaan jauh di bidang kehutanan. ・Application of remote sensing techniques in forest area.
1986- 6	Ch. Soeyamto Djumali Mardji	I	・Hama penggerek batang pada tegakan Acacia Mangium Wild dan Gmelina Arborea di PT. ITCI. Kenangan Balikpapan. ・Borer insects attack to Acacia Mangium Wild and Gmelina Arborea at PT. ITCI in Kenangan, Balikpapan.
1986- 7	Syarif Effendi Seiichi Ohta	I	・Metoda pembuatan monolit tanah. ・Method of preparation soil monoliths.
1986- 8	Hadi Alikodra Agus Priyono Jawadi B. Hernowo	I	・Kegiatan penelitian tim ekologi satwaliar di hutan lindung Bukit Soeharto Kalimantan Timur. ・Research activities of wildlife ecology team at Bukit Soeharto protection

			forest in East Kalimantan.
1987- 1	Sutedjo Katsuaki Ishii	E	·Preliminary study on tissue culture of dipterocarpaceae.
1987- 2	Sutedjo	I	·Studi observasi teknik propagasi vegetatif pada anggota Dipterocarpaceae. ·Observation study of vegetative propagation technique on Dipterocarpaceae tree.
1987- 3	Risman Situmeang	I	·Aplikasi teknik potret udara untuk mendeteksi hutan yang produktif dan tidak produktif. ·The application of remote sensing technique to detect productive and non productive forest.
1987- 4	Mahmud A. Raimadoya	I	·Efek keragaman spasial training set pada klasifikasi terbimbing penutup lahan hutan. ·Variety effect on spatial training set of classification guidance for the cover of forest area.
1987- 5	=GROUP STUDY=	I	·Studi ekologi satwaliar di hutan lindung Bukit Soeharo Kalimantan Timur. ·Study on wildlife ecology in Bukit Soeharto Protection Forest.
(1)	Jarwadi B. Hernowo Hadi S. Alikodra	I	·Studi pendahuluan habitat dan perilaku burung kuwau (Argusianus argus) di hutan lindung Bukit Soeharto Kalimantan Timur. ·Preliminary study on habitat and behavior of Great Argus(Argusianus argus) in Bukit Soeharto National Forest, East Kalimantan.
(2)	Nyoto Santoso Hadi S. Alikodra	I	·Studi populasi sambar (Cervus unicolor Brookei) di hutan lindung Bukit Soeharto Kalimantan Timur. ·Population study of Sambar(Cervus unicolor Brookei) in Bukit Soeharto National Forest, East Kalimantan.

(3)	Agus Priyono	I	・Distribusi biota air di perairan Sungai Samboja di hutan lindung Bukit Soeharto Kalimantan Timur. ・Organism distribution by water streams at Samboja in Bukit Soeharto National Forest, East Kalimantan.
(4)	Dones Rinaldi Hadi S. Alikodra	I	・Studi pendahuluan distribusi dan populasi Owa (Hylobates muelleri) di hutan lindung Bukit Soeharto Kalimantan Timur. ・Preliminary study on distribution and population of Owa (Hylobates muelleri) in Bukit Soeharto National Foerst, East Kalimantan.
(5)	Haryanto	E	・Preliminary study on the habitat of Mueller's gibbons (Hylobates muelleri) in Bukit Soeharto protection forest, East Kalimantan.
(6)	Yeni Aryati Mulyani Hadi S. Alikodra	E	・A study on the distribution of Hornbills (Bucerotidae) in Bukit Soeharto protection forest, East Kalimantan.
1987- 6	Satyawati Hadi J.B. Lung	E	・Swidden cultivation among the Indegenous Tribe of East Kalimantan with special emphasis on socio-economic factors.
1987- 7	Paulus Matius Yasuyuki Okimori B.D.A.S. Simarangkir	I	・Suksesi sekunder dan dinamika hutan Dipterocarpaceae dataran rendah bekas terbakar. [Bagian 1]: Komposisi floristik dan struktur hutan Dipterocarpaceae daratan rendah bekas terbakar di Hutan Pendidikan Universitas Mulawarman, Kawasan Taman Hutan Raya Bukit Soeharto, Kalimantan Timur. ・Secondary sucsession and dynamic of tropical lowland Dipterocarp forest largely burnt. [Part-1]: Floristic composition and structure of tropical lowland Dipterocarpaceae forest largely burnt at educational forest of Mulawarman University in Bukit Soeharto National Forest, East Kalimantan.

1987- 8	Syarif Effendi Seiichi Ohta	I	・Penelitian dasar tentang sifat-sifat fisik tanah pada hutan Dipterocarpaceae dataran rendah di Kalimantan Timur. ・Research on basic characteristic and classification of soils of lowland Dipterocarp forest in East Kalimantan.
1988- 1	Mahmud A. Raimadoya	I	・Tranformasi tekstural citra STAR-1 SAR untuk aplikasi penutup lahan hutan. ・Textural transformation of STAR-1 SAR image for forest land cover application. <<FINAL REPORT>>
1988- 2	Mahmud A. Raimadoya	I	・Tranformasi tekstural citra STAR-1 SAR untuk aplikasi penutup lahan hutan. ・Textural transformation of STAR-1 SAR image for forest land cover application. <<PROGRESS REPORT-I>>
1988- 3	Mahmud A. Raimadoya	I	・Tranformasi tekstural citra STAR-1 SAR untuk aplikasi penutup lahan hutan. ・Textural transformation of STAR-1 SAR image for forest land cover application. <<PROGRESS REPORT-II>>
1988- 4	Daniel murdiyarso	I	・Micro climatological studies of tropical rain forest in East Kalimantan.
1988- 5	Hadi S. Alikodra Yeni Aryati Mulyani	I	・Studi ekologi satwaliar di hutan lindung Bukit Soeharo Kalimantan Timur. ・Study on wildlife ecology in Bukit Soeharto Protection Forest. <<PROGRESS REPORT>>
1988- 6	Hadi S. Alikodra Yeni Aryati Mulyani	I	・Studi ekologi satwaliar di hutan lindung Bukit Soeharo Kalimantan Timur. ・Study on wildlife ecology in Bukit Soeharto Protection Forest. <<FINAL REPORT>>
1988- 7	Sahid Budi Murdawa Supriyandono	I	・Peranan intensitas cahaya terhadap pertumbuhan anakan Dipterocarpaceae. ・The sunlight role on Dipterocarpaceae seedlings growth.

1988- 8	B. D. A. S. Simarangkir Paulus Matius	I	・Jatuhnya bahan organik dan proses pembusukan di hutan tropis basah Taman Hutan Raya Bukit Soeharto Kalimantan Timur. ・Litterfall and decomposition process in tropical rain forest at Bukit Soeharto, East Kalimantan.
1988- 9	Ach. A. Bratawinata	I	・Vegetation community and edaphic factors of Damar (Agathis borneensis Warb) forest type on the Mount Embut in Long Apung, East Kalimantan.
1988-10	Soetrisno Hadi Agus Darmawan	I	・Morfologi dan anatomi mikoriza pada beberapa jenis Dipterocarpaceae. ・Morphology and anatomy on mycorrhiza with Dipterocarp tree species. <<FINAL REPORT>>
1988-11	Soetrisno Hadi Agus Darmawan	I	・Morfologi dan anatomi mikoriza pada beberapa jenis Dipterocarpaceae. ・Morphology and anatomy on mycorrhiza with Dipterocarp tree species. <<PROGRESS REPORT>>
1988-12	Lies Rahayu WF Sahid Supriyandono	I	・Pengujian berbagai bentuk stek untuk pengembang biakan tanaman sungkai (Peronema cancescens Jack) dan gmelina(Gmelina arborea Roxb) untuk Hutan Tanaman Industri. ・Comparation of different cutting methods for the regeneration of peronema cancescens Jack. and Gmelina arborea Roxb. for industrial forest plantation.
1988-13	Wawan Kustiawan	I	・Penggunaan pupuk lambat urai dalam kegiatan penanaman pengayaan dengan jenis-jenis Dipterokarpa. ・Application of slow release fertilizer in enrichment planting with Dipterocarp species.
1988-14	Ripto Permono	I	・Aspek teknologi benih pohon-pohon hutan Dipterocarpaceae di Bukit Soeharto Kalimantan Timur. ・Seed technology of Dipterocarp forest trees at Bukit Soeharto.

1988-15	Syarif Effendi	I	・Tentang tingkah laku air tanah di Bukit Soeharto. ・Soil water behavior in sandy and clayey ultisols of lowland Dipterocarp forest in Bukit Soeharto, East Kalimantan.
1988-16	Abubakar M. Lahjie	I	・Historical and present trends of agroforestry in East Kalimantan.
1989- 1	Risman Situmeang Sumaryono	I	・Klasifikasi penggunaan lahan hutan di Bukit Soeharto dengan menggunakan tehnik penginderaan jauh. ・Land use classification using remote sensing technique.
1989- 2	Mahmud A. Raimadoya	I	・Aplikasi pesawat ultra ringan dalam pemotretan udara 35-mm. ・Application of ultra light aircraft in 35mm aerial photography.
1989- 3	Paulus Matius Yasuyuki Okimori	E	・Secondary succession and dynamics of lowland forest largely burned in East Kalimantan. -Vegetation study on floristic and structural change of swidden cultivation.- <<PROGRESS REPORT>>
1989- 4	Paulus Matius Yasuyuki Okimori	E	・Secondary succession and dynamics of lowland forest largely burned in East Kalimantan. -Vegetation study on floristic and structural change of swidden cultivation.- <<FINAL REPORT>>
1989- 5	Paulus Matius Yasuyuki Okimori	E	・Secondary succession and dynamics of lowland forest largely burned in East Kalimantan. -Vegetation study on floristic and structural change of swidden cultivation.- <<FINAL REPORT-II>>
1989- 6	B. D. A. S. Simarangkir	I	・Jatuhnya bahan organik dan proses pembusukan di hutan tropis basah Taman Hutan Raya Bukit Soeharto, Kalimantan Timur. ・Litterfall and decomposition process on tropical rain forest at Bukit Soeharto.

1989- 7	Hadi S. Alikordra Shigeki Yasuma Nyoto Santoso Riekso Soekmadi Erna Suzanna	I	・Studi ekologi bekantan (Nasalis larvatus Wurmb, 1781) di Hutan Lindung Bukit Soeharto, Kalimantan Timur. ・Ecological study of Proboscis Monkey in Bukit Soeharto.
1989- 8	Daniel Murdiyarso	E	・Interception study on tropical rain forest in East Kalimantan.
1989- 9 -10	Suhardi Agus Darmawan	E I	・Pengaruh intensitas cahaya dan tipe tanah terhadap formasi Mikoriza dan pertumbuhan semai Shorea academia. ・Effect of light intensity, soil type and inoculation on the mycorrhiza formation and growth of Shorea academia seedlings. {No. 9--[ENGLISH], No. 10--[INDONESIAN]}
1989-11	Wawan Kustiawan	I	・Pengaruh jenis dan dosis pupuk lambat urai dalam meningkatkan pertumbuhan semai dipterokarpa. ・Application of slow release fertilizer in enrichment planting with Dipterocarps species.
1989-12	Sutedjo	I	・Studi observasi pembiakan dua jenis pohon komersil dengan teknik kultur jaringan. ・An observation study on tissue culture of two commercial forest tree species.
1989-13	Mubarizi Arifin	I	・Seed technology of Dipterocarp trees at Taman Hutan Raya Bukit Soeharto, East Kalimantan.
1989-14	Daddy Ruchiyat Soeyitno Soedirman Mansur Fatawi	I	・Study on physiology and growth of tropical tree species on marginal soil in East Kalimantan.

1989-15	CH. Soeyamto Rahmad Hernadi Muchlis Rachmat Yos Tunggara Bachman	I	・Potential pest and diseases of tropical forest in East Kalimantan.
1989-16	Syarif Effendi	I	・Tentang tingkah laku air tanah di Bukit Soeharto. ・Soil water behavior in sandy and clayey ultisols of lowland Dipterocarp forest in Bukit Soeharto, East Kalimantan. <<FINAL REPORT>>
1989-17	Syarif Effendi	I	・Tentang tingkah laku air tanah di Bukit Soeharto. ・Soil water behavior in sandy and clayey ultisols of lowland Dipterocarp forest in Bukit Soeharto, East Kalimantan. <<PROGRESS REPORT>>
1990- 1	Syarif Effendi	I	・Sifat umum dan tingkat kesuburan tanah pada daerah Mesozonic metamorphic di Kabupaten Pasir - Kalimantan Timur. ・General characteristic and productivity level of soil at mesozonic metamorphic in Pasir District, East Kalimantan.
1990- 2	Daddy Ruchiyat Abubakar M. Lahjie	I	・Development of soil properties and productivity in different succession stage of swidden cultivation systems of Dayak Kenyah in East Kalimantan.
1990- 3	Oteng Haridjaja	I	・Pengaruh hutan terbakar dan tanaman lada terhadap erosi dan aliran permukaan. ・Effect of burnt forest and crops to erosion and surface run off in East Kalimantan.
1990- 4	Ach. A. Bratawinata	I	・Timber stand improvement (TSI) on logged over dipterocarps and after forest fire in Taman Hutan Raya, Bukit Soeharto, East Kalimantan.

1990- 5	Paulus Matius	I	・Studi tentang proses regenerasi hutan pada bekas tebang pilih dengan kondisi yang berbeda. ・Study of regeneration process under the different selective conditions.
1990- 6	B. D. A. S. Simarangkir	I	・Jatuhnya bahan organik dan proses pembusukan di hutan tropis basah Taman Hutan Raya Bukit Soeharto Kalimantan Timur. ・Litterfall and decomposition process in tropical rain forest at Bukit Soeharto, East Kalimantan.
1990- 7	Daniel Murdiyarso	E	・Ecophysiological studies of tropical rain forest in East Kalimantan. (Photosynthetic responses of some dipterocarpaceae and fast-growing species.)
1990- 8	Mahmud A. Raimadoya	I	・Karakterisasi citra SAR dengan metode target terdistribusi. ・Characterization of SAR image by distributed target method.
1990- 9	Hadi S. Alikodra Shigeki Yasuma Abdul Haris Mustari	I	・Studi ekologi dan konservasi Bekantan (Nasalis larvatus Wurmb, 1781) di Hutan Lindung Bukit Soeharto Kalimantan Timur. ・Research on wildlife ecology and conservatin of Primates in Bukit Soeharto, East Kalimantan.
1990-10	Mubarizi Arifin	I	・Controlling of seedling growth for the stock in large scale plantations.
1990-11	Suhardi Agus Darmawan Eny Faridah	I	・Pembentukan mikorisa dengan intensitas sinar moderat pada tanaman Shorea academia di Bukit Soeharto. ・Mycorrhiza formation on medium light intensity of Dipterocarpaceae plant in Bukit Soeharto.
1990-12	Soewarno Hasanbahri Retno Nur Utami Eny Pudji Rahaju	I	・Studi hubungan antara intensitas penyiangan dan pertumbuhan semai Dipterocarpaceae di Hutan Penelitian Bukit Soeharto. ・Study on the relationship between weeding intensity and growth of Dipterocarpaceae seedling on the logged over area.

1990-13	Rita Diana Sutedjo Yoshihiko Nishiyama	I	・Study on cutting techniques of Dipterocarps.
1990-14	J. Siahaya	I	・Suatu studi tentang jenis-jenis rotan tanaman dan potensinya pada areal hutan Dipterokarpa di Kecamatan Bungan, Kalimantan Timur. ・A study species of Rattan plantations among the Dipterocarps forest and its potency in Bungan, East Kalimantan.
1991-1-1	Syarif Effendi Kazuhito Morisada	I	・Research on soil-water behavior in primary forest, secondary forest and grass land of lowland Dipterocarp forest area in Bukit Soeharto, East Kalimantan.
1991-1-2	Soeyitno Soedirman	I	・Studi kapabilitas potensial tegakan hutan alam primer. ・Study on the potential capability of natural forest stand.
1991-1-3	Oteng Haridjaja Baba Barus	I	・Pemetaan erosi dengan citra penginderaan jauh study kasus daerah Taman di Bukit Soeharto, Kalimantan Timur. ・Erosion mapping by using remote sensing imagery; A case study on Bukit Soeharto area in East Kalimantan.
1991-1-4	Ach. A. Bratawinata	I	・Pembinaan tegakan sisa pada areal hutan Dipterocarpaceae bekas eksploitasi dan kebakaran hutan di daerah Taman Hutan Raya Bukit Soeharto, Kalimantan Timur. ・Timber stand improvement (TSI) on logged over Dipterocarpaceae and after forest fire in Bukit Soeharto National Forest, East Kalimantan.
1991-1-5	Paulus Matius	I	・Regenerasi alamiah pada areal hutan bekas perladangan berpindah. ・Natural regeneration with reference to ecosystem disturbance caused by swidden cultivation.

1991-1-6	Daniel Murdiyarso	E	・Photosynthetic response to environmental variables of pioneer species and their relevance to the tropical rain forest dynamic.
1991-1-7	F.X.Dwisutanto	I	・Pengamatan tentang hubungan antara kondisi lingkungan dan pertumbuhan pada jenis Shorea laevis dan Shorea leprosula. ・Study on relationship site environmental condition within Shorea laevis and Shorea leprosula growth in eastern Borneo.
1991-1-8	Hadi S. Alikodra Abdul Haris Mustari Shigeki Yasuma	I	・Studi ecologi dan konservasi Bekantan (Nasalis larvatus Wurmb. 1781) di delta Sungai Mahakam Kalimantan Timur. ・Conservation and ecological study of Bekantan (Nasalis larvatus Wurmb. 1781) at Bukit Soeharto forest area, eastern Borneo.
1991-1-9	Kadar Soetrisno	I	・Evaluation of the interaction of two environmental factor (Light and Nitrogen) on the growth of some Dipterocarps seedlings.
1991-1-10	Rita Diana Y. Nishiyama Mubarizi Arifin	I	・Pengendalian pertumbuhan semai untuk persediaan bibit pada areal penanaman berskala luas. ・Controlling of seedling growth for the stock in large scale plantation. <<Phase II>>
1991-1-11	Slamet Mulyono	I	・Pengetrapan model transmigrasi dalam pembangunan Hutan Tanaman Industri di PT.KIANI LESTARI, Batu Ampar, Kalimantan Timur. ・The study on the application of transmigration model to the establishment of industrial forest plantation programme in Batu Ampar, East Kalimantan.
1991-2-1	Daddy Ruchiyat	I	・Evaluasi kesesuaian tempat tumbuh tiga jenis tanaman HTI di Kalimantan Timur. ・Site matching studies of three tree species for plantation.

1991-2-2	Ch. Soeyamto	I	・Study ekologi tikus di hutan lindung Bukit Soeharto, Kalimantan Timur ・Ecological studies on rats in Bukit Soeharto protection forest.
1991-2-3	Sukartiningsih	I	・Studi sterilisasi explant dan media culture dalam teknik kultur jaringan pada beberapa jenis Dipterocarpaceae. ・Studies on sterillization of explant and culture media in tissue culture work for some Dipterocarp species.
1991-2-4	Mansur Fatawi Kadar Sutrisno	I	・Photosynthesis, respiration and growth of Tengkawang seedling grown under the various of relative light intensities.
1991-2-5	Suhardi Eny Faridah Ecep Iskandar Sri Rahayu	I	・The growth of Shorea smithiana after mycorrhiza inoculation, decomposed of cow dung and rockposfat fertilizer at Bukit Soeharto.

List of academic research cooperation reports by Japanese experts.

No.	Year-Month	Authors	Title
		[Phase I : JAN, 1985 ～ DEC, 1989]	
1	1986-10	Shigeki YASUMA	The Mammalian Fauna in Bukit Soeharto protection forest. (I)
2	1986-10	Ichiro HONGO	The research report on repairing of Scanning Electron Microscope (SEM) and training of user maintenance.
3	1986-10	Yoshio AWAYA	Report on Image Analysis System for remote sensing.
4	1987-03	Atsushi KOKUBO	Researche in the field of 'Natural Forest Management
5	1987-03	Shigeru TAKAHATA	Landuse classification and planning.
6	1987-09	Shigeki YASUMA	The Mammalian Fauna in Bukit Soeharto protection forest. (II)
7	1988-02	Katsuaki ISHII Sutedjo	Preliminary study on tissue culture of Dipterocarpaceae.
8	1988-05	Satoru MIURA	Report on soil micromorphology of acrisols in Kalimantan Timur.
9	1988-05	Nagaharu TANAKA	The research on soil-water behaviour and soil structure on slope of ultisols.
10	1988-08	Seiichi OHTA	Soils of lowland Dipterocarp forest in East Kalimantan, Indonesia.
11	1988-	Susumu SUZUKI Wawan Kustiawan	Soil and fertilizer for the pot seedlings at a nursery.

12	1988-12	Susumu MIYATAKE Susumu SUZUKI Wawan Kustiawan	Report on establishment of research forest by group-planting in Bukit Soeharto university forest, East Kalimantan.
13	1989-03	Shigeki YASUMA	The Mammalian Fauna in Bukit Soeharto protection forest. (III)
14	1989-03	Satoshi TSUYUKI	A short term expert report on remote sensing.
15	1989-04	Makoto OGAWA	Mycorrhizae and their utilization in forestry.
16	1989-12	Shigeki YASUMA	Present distribution of Proboscis monkey (Nasalis larvatus) concern with its distributions in and around Bukit Soeharto protection forest.
17	1989-12	Makoto INOUE	Swidden cultivation in East Kalimantan.
		[Phase II : JAN,1990 ～ DEC,1994]	
18	1990-03	Makoto OGAWA	Ectomycorrhiza of Dipterocarpaceae and the utilization in nursery practice.
19	1990-05	Satoru MIURA	Soil developing on various geological parent materials in southern part of East Kalimantan.
20	1990-05	Tetsuo OKANO	Construction of measurement system for analyzing photosynthesis and transpiration of trees.
21	1990-12	Yuji ISAGI Paulus Matius	Changes in forest structure after selective cutting at Kabupaten Pasir.

22	1991-02	Satoshi ITO	Water relations and dry matter partitioning of several Dipterocarp species seedlings growing under water stress.
23	1991-03	Kazuhito MORISADA	On measurement of soil respiration.
24	1991-03	Yasuyuki OKIMORI	Research on regeneration process in secondary forest of tropical rain forest, East Kalimantan.
25	1992-04	Makoto OGAWA	Ectomycorrhiza of Dipterocarps and the utilization for reforestation.
26	1991-10	Yasuyuki OKIMORI	Establishment of demonstration forest.
27	1991-10	Yoshiyuki KIYONO Paulus Matius	Understory vegetation and distribution of seedlings and saplings of Dipterocarp and Ulin (Eusideroxylon zwageri) in Bukit Soeharto experimental forest, East Kalimantan.
28	1991-11	Seiichi OHTA	Report of short term research cooperation in the field of soil science.
29	1992-02	Ryuichi WATANABE	Dynamics of tropical rain forest on Bukit Soeharto experimental forest of Mulawarman University.
30	1992-03	Yoshihiko NISHIYAMA	Research on; 1. Growth responses of Dipterocarp seedlings to light intensity. 2. Desiccation and germination of Dipterocarp fruit.
31	1992-04	Makoto OGAWA	Ectomycorrhiza of Dipterocarps and the utilization for reforestation.
32	1992-09	Manabu KUSUNOKI Djumali Mardji Ecep Iskandar	Big bud disease on Shorea bracteolata and Parasitic thread blight of Ulin (Eusideroxylon zwageri).

33	1992-11	Seiichi OHTA	Characteristic of soils under alang-alang grassland East Kalimantan, Indonesia. I. Status of carbon, Nitrogen and Phosphorus.
34	1992-12	Kazuhito MORISADA	Soil nutrient status of different fallow period after swidden cultivation in Mencimai, East Kalimantan, Indonesia.
35	1993-03	Makoto OGAWA	Ectomycorrhiza of Dipterocarps and the utilization for reforestation.
36	1993-11	Seiichi OTA	Characteristics of soils under secondary forests in East Kalimantan, Indonesia. I. Status of carbon, Nitrogen and Phosphorus.
37	1994-02	Shigeta MORI Marjenah	Ectomycorriza of Dipterocarpaceae and the utilization for reforestation.
38	1994-04	Isamu OKOCHI Fatiah	Insects and amphibians in Bukit Soeharto experimental forest.
39	1994-05	Yoshiyuki KIYONO	Forest exploitation and succeeding vegetation in East Kalimantan, Indonesia.

第５章　案件の効果

5-1　効果の内容

(1)　研究協力の効果

研究協力の効果を測るひとつの目安として、フェーズＩの協力途中で、ＢＡＰＰＥＮＡＳ（開発企画庁）との協議で、研究レポートの提出数をひとつの方式としようということになり、その後、ＰＵＳＲＥＨＵＴはフェーズＩ、フェーズⅡを通じて、研究レポートの提出、セミナー発表に力を入れてきた。長期専門家は通常、カウンターパートと組になってレポートの提出を行っており、短期専門家の場合も、原則的にレポート提出を行っている。

さらに、フェーズⅡではニューズレター（PUSREHUT News）とAnnual Reportが作られるようになった。前者はＰＵＳＲＥＨＵＴの研究活動の近況・概況ニュースを数頁で紹介するもので、年２回の刊行である。後者は学術的研究報告書で、多数の研究成果のなかから選ばれたものを詳細に報告するものである。これらニューズレターとAnnual ReportによりＰＵＳＲＥＨＵＴの研究活動は広く、国内はもちろん、国外へも紹介されている。

以上により技術的効果の内容を広範の人々が知ることができる。

(2)　制度的な効果

制度的な効果としては、ＵＮＭＵＬ林学部の数的・質的内容の向上がある。

1962年ＵＮＭＵＬ設立当初の林学教官は６名、1974年は21名（修士号取得者は１名）にすぎなかったものが、1990年には64名（このうち修士号取得者は18名、博士号取得者は13名）となり、1994年には67名（修士号取得者は33名、博士号取得者は19名）となった。　また、1993年９月、ＵＮＭＵＬ林学部に修士課程の大学院設立が実現し、さらに将来博士課程の設計も計画されるまでになっている。

インドネシアには９つの国立大学に林学部または林学科があるが、ＵＮＭＵＬ林学部は９国立大学のなかにあってＩＰＢ、ＵＧＭに次いで第３の位置を占めるまでになっている（このほかに私立大学には林学科を持つものが多数ある。第４章表22参照）。

インドネシアは林業国であり、１億9000万haの国土面積のうち75％の１億4400万haが森林で占められている。この森林は大部分が熱帯降雨林地帯にあって、地球環境保全のうえから、ますますその存在が重要視されるようになってきている。このためインドネシアの大学林業教育と研究は、さらに充実されていく必要があり、ＵＮＭＵＬやＰＵＳＲＥＨＵＴの発展はこれまでも強力に進められてきたが、これからもさらに続けられるべきものである。

(3) 経済的効果

経済的効果については、民間企業の研究成果なら別であるが、大学レベルのものについて、目に見える効果は通常でてきにくく、長期的に見る必要がある。

インドネシア林産業の発展は近年めざましいものがあり、そこでの人材需要は年々増加してきている。ＵＮＭＵＬ林学部が発展し、学生教育も盛んとなり、送り出す卒業生の数はインドネシアの全大学のなかにあっても大きいほうであるから、ＵＮＭＵＬは産業の発展に大きく貢献していることになる。

(4) 社会文化的効果

ＵＮＭＵＬはもともと林学部の名声が高かった。これはサマリンダが熱帯林業の中心地であったためでもある。そのＵＮＭＵＬにあって、林学部のめざましい進展にともなってＵＮＭＵＬ全体の５学部も計画以上に進展しているようである。というのは、設立当初はＵＮＭＵＬは市街地のなかにあり、面積的に発展が困難であるため、約20年前に郊外の現在地に、大きなプランとともに引っ越ししてきた。当時は夢のような大プランも、現在それが大半実現し、なお発展を続けており、東カリマンタン州サマリンダ市にムラワルマン大学ありという状況になっている。この牽引車的役割はＪＩＣＡ林業プロジェクトが行ってきた。東カリマンタンの文化的学問的水準の向上にＪＩＣＡプロジェクトは着実に貢献しているということができる。

(5) 環境的効果

熱帯降雨林の保全とともに熱帯林業の発展は、インドネシアの社会・経済の発展のなかで大きな位置を占めている。カリマンタンは何といっても森林・林業地帯であるが、放置しておけば、農業開発が進み、森林面積は相対的に減少し、最後は荒廃地（アランアラン＝草地）の拡大が危惧される。

今後は、持続性のある林業開発とともに森林保全にも力を入れていかなければならない。ＰＵＳＲＥＨＵＴプロジェクトにはこれからもさらに、カリマンタンの熱帯降雨林の適正な管理のリーダーとしての役割が期待されるところである。

5-2 効果の広がりと受益者の範囲

ＰＵＳＲＥＨＵＴプロジェクトの直接の受益者はＵＮＭＵＬ林学部であって、そこの教官および学生には大きな可能性と希望を与えつつある。ひとつの大学の地位・レベルが向上していくことは、他の大学へも良好な効果が期待できて、インドネシアの教育文化全般にとって喜ばしいことであるといえる。

一方、産業界、特に林業界にとっても優秀な卒業生が業界の求めに応じて次々に送り出されてくるのであるから歓迎すべきことといえる。

カリマンタンの熱帯降雨林については、これからが大事な時期であって、関係者の努力によって保全と開発、両者の調和をとりつつ実現していかなければならないのであって、それが実現されることになれば、その利益は世界全体のものと考えてよい。なぜなら、東南アジアの熱帯降雨林の中心ともいうべきカリマンタンの森林の持続性のある開発は、世界の人々の望むことであるからである。

第６章　自立的発展の見通し

6-1　組織的自立発展の見通し

(1)　実施機関

ＰＵＳＲＥＨＵＴは1981年、1988年の２回に分けて日本政府の無償資金協力によりインドネシア政府教育文化省高等教育総局に供与された研究施設である。当該プロジェクトのフェーズＩとフェーズⅡに関するＲ／Ｄによると、ＰＵＳＲＥＨＵＴは教育文化省高等教育総局の直属の研究機関として位置づけられており、その管理・運営は高等教育総局が直接行うこととなっている。

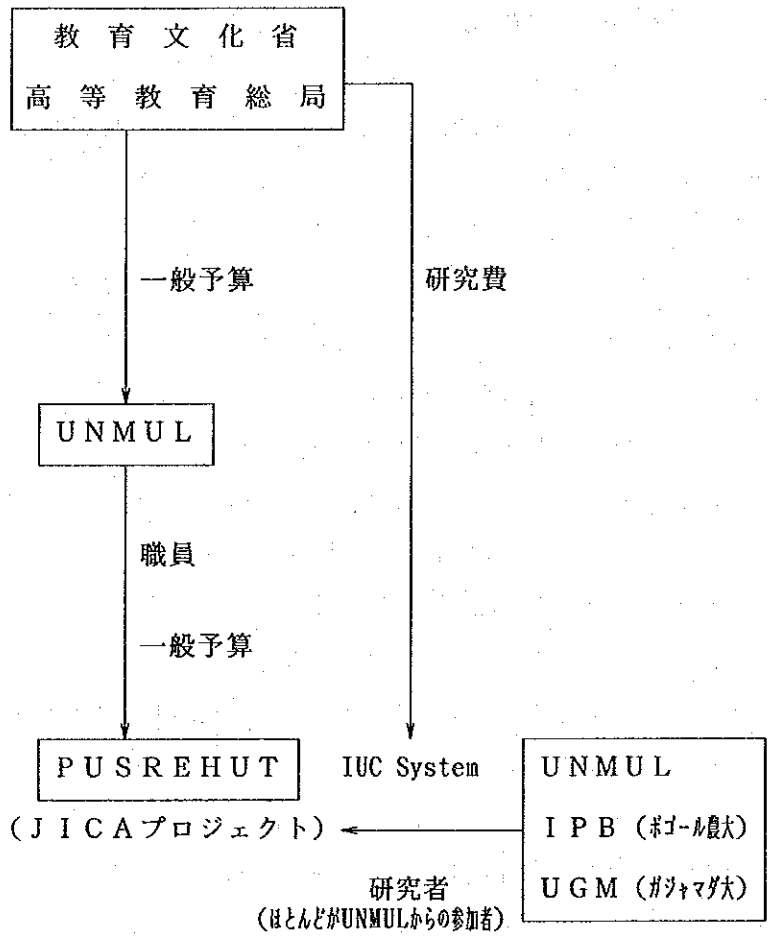
しかしながら教育文化省高等教育総局の認識はＲ／Ｄ上での位置づけと大きく異なっている。つまりＰＵＳＲＥＨＵＴは日本政府よりムラワルマン大学（ＵＮＭＵＬ）に供与された施設であり、ＵＮＭＵＬの付属施設としての位置づけにある。また、現実の運営もＵＮＭＵＬの付属機関としてなされている。つまり、カウンターパートである研究者については、所長と２名の副所長および６名の研究室長の９名の役職者すべてがＵＮＭＵＬの教官である。またその他のカウンターパート研究者も、過去に数名ボゴール農大、ガジャマダ大からの参加者がいたが、現在はすべてＵＮＭＵＬの教官で占められている。しかも、現在１名を除く27名のカウンターパート研究者が本籍をＵＮＭＵＬにおく非常勤形態である。彼らの本俸は本籍を置くＵＮＭＵＬから支給される。また、事務職員、助手、作業員等の一般職員はＰＵＳＲＥＨＵＴの常勤であるが、もともとはＵＮＭＵＬの職員であったものがＰＵＳＲＥＨＵＴに配属されたものである。

ＰＵＳＲＥＨＵＴの予算も研究費以外の一般経費（職員給与、消耗品費、電話・光熱費など）は高等教育総局からいったんＵＮＭＵＬに入り、その後ＰＵＳＲＥＨＵＴに配分される仕組みとなっている（図１参照）。

当該プロジェクトについては毎年開催されるジョイント・コミッティーにより過去１年間の研究成果が評価され、ＴＳＩに基づいた今後１年間の研究計画が審議・採択される。

また、ジョイント・コミッティーの下にリサーチ・コミッティーが置かれ、個々の研究分野ごとの研究活動の調整がなされる。これらのコミッティーは高等教育総局幹部およびＩＵＣ（Inter University Center）参加の３大学代表者がメンバーに加わっており、有効に機能しているようである。そのため当該プロジェクト運営に必要なインドネシア側のローカルコストは、研究費をも含め必要額が確保されている。

図1　ＰＵＳＲＥＨＵＴ運営の組織図



(2)　管理運営体制

現在、ＰＵＳＲＥＨＵＴの運営は、前述したとおり所長と２名の副所長、さらに６つの研究室を担当するそれぞれの研究室長が責任をもって行う体制となっている。予算、施設、機材等の管理は所長・副所長が集中的に厳しく行っているようで、過去に問題となった機材の紛失などは現在はないという。現在の所長、副所長に関する日本人専門家の評価も高い。しかしながら、研究者のＰＵＳＲＥＨＵＴでの勤務状態についての管理は実施体制のあり方からみてルーズな面がみられる。上述したとおり、現在のカウンターパート研究者のほとんどは非常勤である。ＰＵＳＲＥＨＵＴの内規では非常勤の場合１週間に最低12時間勤務することが義務づけられているが、出勤簿、タイムカードなど時間管理の手段がないため、実際に何時間ＰＵＳＲＥＨＵＴに出てきているか把握できていない。今後、ＰＵＳＲＥＨＵＴの研究活動の拡大を図るためには、研究者の

ＰＵＳＲＥＨＵＴにおける活動の強化・充実が不可欠であり、この面での適切な時間管理の導入が必要となる。

さらに研究費についてもＰＵＳＲＥＨＵＴ側として十分に管理できる制度になっていない。つまりＩＵＣから支給される研究費は１研究テーマにつきおよそ1000万ルピアであり、このうち共通経費として20%程度が差し引かれた残りの800万ルピア程度の額がＰＵＳＲＥＨＵＴを経由することなく直接カウンターパート個人に支給される。この研究費については特に決算資料を提出する義務もなく、使途は個々のカウンターパートの裁量に委ねられている。しかし、研究費をより効果的に活用するためには、研究費をいったんＰＵＳＲＥＨＵＴにプールし計画的に支出するなどの工夫が必要である。

(3) 組織の改廃

ＰＵＳＲＥＨＵＴにＩＵＣシステムが導入されたことから、これまで世銀の援助などにより比較的潤沢な研究費が配布されてきた。このＩＵＣシステムが今年度終了し、新たにＵＲＧＥ（University Research for Graduate Education）システムが発足することとなった。これは、やはり世銀の出資などによる大学院研究への援助であるが、ＩＵＣからＵＲＧＥへ移行することにより従来の３大学共同研究体制が解消され、ＰＵＳＲＥＨＵＴの研究はＵＮＭＵＬのみに限定される可能性がある。

6-2 財務的自立発展の見通し

(1) 必要経費調達の見通し

ＩＵＣが解消し新たにＵＲＧＥシステムが発足するが、ＰＵＳＲＥＨＵＴにＵＲＧＥが導入されなければ必要経費調達の見通しはたたない。ＵＲＧＥの導入に関係なくＰＵＳＲＥＨＵＴの一般経費は配布されるだろうが、これだけでは研究活動を継続することはきわめて困難である。また、トレーニングセンター、セミナールームなどの使用料による自己収入があるが、これとても３研究テーマをカバーする程度の額にすぎない。

ＵＲＧＥシステムが導入され、申請したプロポーザルが採択されるまでには、かなりの困難が予想されるが、ＪＩＣＡのプロジェクトが継続していることにより、その可能性が高まると考えられる。

(2) 公的補助とその安定性の見通し

ＰＵＳＲＥＨＵＴ－ＪＩＣＡプロジェクトの予算措置は、インドネシア側のローカルコストおよび日本側のローカルコストならびに日本側の供与機材からなる（表１参照）。このうちインドネシア側のローカルコストは大きく分類するとＩＵＣシステムによる研究費と職員給与、消耗品費、電話代などからなる一般経費に区分される。

仮に当該プロジェクトを終了し、ＰＵＳＲＥＨＵＴの運営をすべてインドネシア側に

移管した場合、来年度発足するＵＲＧＥシステムによる研究費のつき方にもよるが、現在、機材、出版物、セミナーなどの経費を日本側に大きく依存している状況からすれば、ＰＵＳＲＥＨＵＴの運営はかなり困難となろう。

表１　日本・インドネシア予算比較表（1993年度）

日本側予算	ローカルコスト	943
	供与機材	2,492
	小計	3,435
	（負担率）	(65%)
インドネシア側予算	ローカルコスト	1,881（うち、一般的経費は全体の57%相当の1,042万円）
	小計	1,881
	（負担率）	(35%)
全予算		5,316

（単位：万円）

(3)　自主財源による費用回収状況

上述した日本側およびインドネシア側から予算措置以外、ＰＵＳＲＥＨＵＴの収入についてはトレーニングセンター（1988年無償資金協力により建設された研修、宿泊施設）、ＰＵＳＲＥＨＵＴ内セミナールームおよびブキットスハルト演習林宿泊施設の利用料ならびに土壌サンプル分析のための土壌研究室の利用料があり、これらの合計で年間3000万ルピア（純益ベース）程度の自己収入が期待される。

しかしながら、年間3000万ルピア（150万円程度）の収入は、全体予算の３％程度にすぎず、また、現状の利用形態では大きな収入増を期待することもできない。将来、ＰＵＳＲＥＨＵＴの研究施設を外部利用者に開放し利用料を徴収するシステムができれば、自己収入をさらに増やすことも可能となろう。

(4)　リカレント・コスト負担の必要性と妥当性

仮に当該プロジェクトを終了し、インドネシア側のみでフェーズⅡレベルの研究を継続していくためには、日本側で今後数年間フェーズⅡと同程度のローカルコストおよび供与機材相当額の負担をする必要がある。

6-3　物的・技術的自立発展の見通し

(1)　移転技術の内容と技術レベルの適正度

フェーズⅡでは現在までの期間に13名の長期専門家と25名の短期専門家が派遣された

が、個々の専門分野においてインドネシア側カウンターパートに当初の目的どおりの技術移転がなされたものと考えられる。

(2) 要員配置状況

ＰＵＳＲＥＨＵＴのインドネシア側要員配置は表２のとおりである。

応募研究課題で研究費を受けているカウンターパートが毎年17～24名と多いが、これらカウンターパートのほとんどが地元ＵＮＭＵＬの教官であり、ボゴール農大あるいはガジャマダ大からの参加者がきわめて少ないことが問題であった。その理由としては、ＰＵＳＲＥＨＵＴが東カリマンタンというジャワから遠く隔たった外領にあり交通費がかかること、ジャワの大学にはすでにいろいろなプロジェクトが入り込んでいること、またジャワの上記２大学では産業造林などに関する応用研究へのインセンティブが高いことなどが考えられる。

また今後、どれだけの人数のカウンターパート研究者を確保できるかは、研究費補助システムがＩＵＣからＵＲＧＥに移行した後、どれだけの研究テーマに研究費がつくかということにかかっている。

表２　インドネシア側要員配置実績

職名＼年度	1990（平成２）	1991（平成３）	1992（平成４）	1993（平成５）	1994（平成６）
1．プロジェクト・マネージャー	1	1	1	1	1
2．PUSREHUT研究所顧問	－	－	1	1	2
3．PUSREHUT研究所所長	1	1	1	1	1
4．PUSREHUT研究所副所長	1	1	1	1	2
5．プログラム・オフィサー	4	4	4	4	－
6．研究室長	6	6	6	5	6
7．研究員	4	7	7	3	0
8．管理部門職員	22	20	22	17	17
9．研究室助手	5	5	5	5	5
10．演習林作業員	3	6	6	6	6
11．トレーニング・センター職員	4	5	5	5	4
小　　計	51	56	59	49	44
12．応募研究課題Ｃ／Ｐ	18	18	24	17	18
計	69	74	83	66	62

（単位：人）

(3) 技術定着状況

カウンターパート配置実績は表３のとおりであるが、現在、28名のうちドクターが10名、マスターが４名、その他の14名もすべてインシニウール（技術系学士）であり、学歴から判断するかぎり十分な配置であるといえる。しかし、日本人専門家からの聞き取りでは、現在のレベルはまだ目標とするレベルまでには隔たりがあり、技術の定着とともに今後の維持・発展が必要である。

(4) 後継者の育成計画

ＵＮＭＵＬには1993年度に大学院が新設され、若く優秀な研究者が集まってきている。カリマンタン４州で林学部あるいは林学科を置く大学は３大学（他に西カリマンタンと南カリマンタンにそれぞれ１大学）しかなく、大学院を持つのはＵＮＭＵＬのみである。そのため、地元の期待も大きく、将来の発展可能性は非常に高い。

6-4 その他の管理運営上の制約要因

ＰＵＳＲＥＨＵＴの研究成果に関し、著作権・知的所有権の帰属について今回のジョイント・エバリュエーション会議でインドネシア側より質問があった。日本人専門家とインドネシア側カウンターパートの共同研究から生まれる知的所有権は個々のケースで協議しその帰属が決定されることとなる。なお、ＰＵＳＲＥＨＵＴの研究成果に関し今までに知的所有権が生じたことはない。

施設・機材の管理運営については一部の機材が老朽化し、修理や取り替えが必要となっているものがある。また、耐用年数を過ぎ老朽化した機材については、インドネシアの法規に基づいて早急に廃棄処分の手続きをとるべきであろう。

表3　PUSREHUT職員配置表（1994年度）　　1994.6.1現在

	役　　職	（氏　　名）	研究課題別C／P	常勤・非常勤	担当専門家
1．顧　問	（学長）	Prof. Dr. Yunus Rasyid, M. A.		非常勤	
	（第1副学長）	Prof. Dr. Riyanto, M. Sc.		〃	金光桂二
2．研究所長		Dr. Maman Sutisna, M. Agr.		〃	〃
3．副所長（学術担当）		Dr. Mansur Fatawi, M. Agr.		〃	〃
〃　（総務担当）		Ir. Oman Suherman, M. Agr.		〃	谷口一郎
4．第1研究分野	土壌研究室長	Ir. Darul Aksa	Ir. Darul Aksa	〃	田中永晴、太田誠一（短期）
			Dr. Triyono Sudarmadi, M. Agr.	〃	〃　、　〃
			Ir. Sri Sarminah	〃	〃　、　〃
第2研究分野	森林生態研究室長	Ir. Hastaniah	Ir. Hastaniah	〃	清野嘉之
			Dr. Daddy Ruhiyat, M. Agr.	〃	〃
			Ir. Syahrinudin	〃	〃
			Ir. Ecep Iskandar	〃	〃
	森林区分（リモセン）研究室長	Ir. Hari Siswanto		〃	清野嘉之
	森林保護研究室長	Ir. Fatiah		〃	安間繁樹、千石正一（短期）
			Ir. Ch. Soeyamto, M. Sc.	〃	〃　、　〃
			Ir. FX Dwisutanto	〃	〃　、　〃
			Ir. Wartomo	〃	〃　、　〃
			Ir. Joko Priyono	〃	〃　、　〃
第3研究分野	造林研究室長	Ir. Marjenah	Ir. Marjenah	〃	森　茂太
			Ir. Ripto Permono, M. Sc.	〃	〃
			Dr. Deddy Hadriyanto, M. Agr.	〃	〃
			Dr. Kadar Soetrisno, M. Agr.	〃	〃
			Dr. Mansur Fatawi, M. Agr.	〃	〃
	組織培養研究室長	Ir. Maringan Simbolon		常　勤	森　茂太
第4研究分野			Dr. A. A. Bratawinata, M. Agr.	非常勤	森　茂太
			Ir. Nurmathias Mahmud	〃	〃
			Dr. Maman Sutisna, M. Agr.	〃	〃
			Dr. Afif Ruhaemi, M. Agr.	〃	〃
			Ir. Oman Suherman, M. Agr.	〃	森　茂太、小川　眞（短期）
			Ir. Enih Rosamah	〃	〃　、　〃
5．総　務	研究所本館……22名			常　勤	
	トレーニング・センター…4名			〃	
	演習林……6名			〃	

※　太枠内が専門家のカウンターパート

第７章　評価結果総括

7-1　評価の総括

(1)　調査目的

各省会議において付託された業務内容は以下のものである。

①　これまで実施した協力について、当初計画に照らし、プロジェクトの活動実績、管理運営状況、カウンターパートへの技術移転状況などについて評価を行う。

②　目標の達成度を判定したうえで、インドネシア側関係者と合同評価を行う。

③　評価結果から目標の達成度、自立発展の見通し、評価結果の総括などを行う。

(2)　総括

1994年６月26日(日)から７月８日(金)まで現地で関係者との合同評価を行った。研究実施状況、施設の利用実態を把握し、教育文化省高等教育総局とミニッツを締結した。

①　研究活動の総合評価

プロジェクトの活動は、インドネシア東カリマンタン州の州都サマリンダに所在するムラワルマン大学（ＵＮＭＵＬ）構内とブキットスハルト森林保護区内の演習林にわが国の無償資金協力によって建設された熱帯降雨林研究センター（ＰＵＳＲＥＨＵＴ）と演習林関連施設を中心に行われている。同地は、有用樹種であるフタバガキ科樹木を中心とした熱帯降雨林のほぼ中心に位置している。演習は、択伐や林野火災の影響を受けているとはいえ、比較的よく保存されており、森林研究フィールドとして十分な環境下にある。また、研究施設、資機材についても、一部は古くなったものもあるが、インドネシア国内では最高水準のものが用意されている。

この研究協力の進捗状況について述べると、研究結果そのものについては日本人専門家の努力によって高水準にある。研究者については、現地プロジェクトと日本の大学との連携から、わが国の大学における修士、博士過程の修了者が増えてきている。一方、ムラワルマン大学に林学の大学院修士課程が1993年に新設された。これにはＰＵＳＲＥＨＵＴの研究レベルの向上が大きな役割を果たしている。

しかし、ＰＵＳＲＥＨＵＴは共同研究の場として設立されたが、ＪＩＣＡプロジェクトの発足とともに始められたムラワルマン大学、ボゴール農科大学、ガジャマダ大学の利用のうち、後者の２大学の利用が微々たるものであり、共同研究の態勢が薄弱である。ただし、研究所の管理・運営については、所長、副所長および数名の事務系職員の配置によって拡充・強化の方向にある。

②　研究活動の個別評価

熱帯降雨林研究計画フェーズⅡの研究計画は、「立地環境の評価」「森林生態系の

解析」「森林生態系の再生技術」「分野間研究」の４分野である。

ａ．「立地環境の評価」分野

主要成果概要：ブキットスハルト演習林付近の代表的・特徴的な土壌について、理化学的諸性質に関するデータが蓄積され、立地評価指標の特定、土壌図の作成が可能となった。また、焼畑などが地方や立地環境に与える影響も予備的に観測し始めた。

問題点と今後の方向：人為の影響が絡んだ土壌変化の解明には、過去の履歴がはっきりした固定試験地を用いた長期間にわたる調査、観測が重要である。

ｂ．「森林生態系の解析」分野

主要成果概要：択伐や山火事、焼畑など異なる撹乱を受けた林および天然生林の更新過程に関する調査研究事例が蓄積され、人為影響の相互比較が可能となりつつある。また、天然林における開花・結実調査や成長量調査、更新調査も継続的に実施され、長期モニタリングの基礎が整い始めた。焼畑跡地の草原で純生産量、炭素蓄積量なども調べられた。ブキットスハルト演習林の哺乳類のおよそ90％は同定され、その生活史の全容も明らかにされつつあり、当地域の新種も確認され、研究所として「東カリマンタンの哺乳類」を出版した。

問題点と今後の方向：この分野の調査研究には、植物の同定が重要である。同定のため、遠く離れたジャワ島のボゴール植物園に頼らなければならない現状にあり、標本の保管とリスト作成が始められていることから、植物標本の整備（ハーバリウム）が不可欠である。動物については、哺乳類以外のものも手がける必要があり、植物標本も含めた博物館機能を研究所が持つ必要がある。

ｃ．「森林生態系の再生技術」分野

主要成果概要：モミがらくん炭を利用した苗畑におけるマイコリザ（菌根菌）の実用的な接種法を確立した。また、感染苗が人工造林地でも好成績であり、インドネシア国内での評価を高いことから、普及パンフレットの作成も行った。

問題点と今後の方向：マイコリザの感染による成長促進に関して、感染の有無による生理的な違いを明らかにするとともに、体系的な育苗技術、造林技術への発展を志向する必要がある。

ｄ．「分野間研究」分野

主要成果概要：立地環境と植栽木の成長との関係解析が進められ、今後の研究・実習に資する展示林や造林方法試験地（ラインプランティング）なども整備された。今後蓄積される成長量データなどが、重要な人工林モニタリングに生かされている。問題点と今後の方向：人工林における密度管理のような造林技術の開発のためには、試験地の面積を拡大し、将来の研究対象試験地とする配慮が今後重要である。

7-2　とるべき措置

インドネシア教育文化省、ＰＵＳＲＥＨＵＴおよびムラワルマン大学はＰＵＳＲＥＨＵＴを東南アジアにおる熱帯降雨林研究の中枢としたい意欲を示しており、そのポテンシャルも備え始めた。現時点で、研究所として拡充・強化の方向にあることから、国際的な研究協力を実施し得る研究所としての発展を実現するため7-4で述べる提言に沿った措置が必要である。

7-3　教訓

研究プロジェクトの場合、相手国カウンターパートの勤務状況、研究資質などを理解して対応する必要がある。すなわち、インドネシアの大学においては、身分・給与が保障されているものの、大学教員にふさわしい給与水準となっていないこと、時間外の兼職に禁止規定のないこと、教員に講義は義務づけられているが研究への義務が明確でないことなどがカウンターパートの研究意欲の低下原因となっている。特に、勤務時間が午前７時30分から午後２時30分までで、結果的に兼職を積極的に進める制度となっている。

また、大学教員の役割が教育、研究、普及とうたっているものの、研究者に配布される人頭経常研究費はなく、また、申請によるプロジェクト研究費も申請者個人に配布され、その使途が個人の裁量権にあることなども、研究意欲の低下、研究所の管理運営のむずかしさにつながっている。

さらに、大学教員の意識としても、修士号、博士号を取得してしまえば最高点に達した研究者として自覚してしまうため、実際の研究に従事する意欲をなくしてしまう。したがって、プロジェクト研究への申請、許諾、実施への意欲も研究費の獲得だけで、研究内容の高度化に向けられていない。

研究プロジェクトの実施にあたっては、特にカウンターパートの勤務実態、研究レベルを十分に見きわめて実施することが望ましい。

7-4　提言

熱帯降雨林研究の実施によってＰＵＳＲＥＨＵＴの自立発展が具体的に期待されるようになった。しかし、現在の仕組みに工夫を加える余地が残されており、これらが改編、整備されればＰＵＳＲＥＨＵＴは少なくとも近い将来に東カリマンタンの試験研究の中枢としての機能を果たすと思われる。今後の改良、改編方向として、調査団の提言は以下のとおりである。

①　ＰＵＳＲＥＨＵＴは３大学の共同利用施設としての役割を終えた。さらに共同研究の道を開くことが研究所の発展に寄与することから、本研究所を教育文化省の直轄機

関とする方向が考えられる。すなわち、研究所のスタッフはムラワルマン大学との併任を避け、常駐の研究専任職員として、講義を担当しないことが望ましい。

② 研究所の拡充・強化には管理運営体制の整備が必要である。従来、研究費は研究者個人に配布されてきたが、これを研究所に直接配布し、研究費の集中管理、経常研究の活性化を図ることが望ましい。また、研究所はＪＩＣＡを含めた海外、国内の共同研究（特に林業省との共同研究）を積極的に推進し、研究所の拡充・強化を図ることが望ましい。

③ 研究所の設置目的および研究目標・研究計画を明確にし、これらに沿った研究資機材の整備が望まれる。

④ 地域レベル、地球的規模で必要とされている森林生態系の長期モニタリングおよび劣化林の回復技術の開発には、ブキットスハルト演習林の拡充整備による有効活用が必要である。

資　　料

1　合同評価会議議事録

MINUTES OF THE JOINT EVALUATION
ON
THE TROPICAL RAIN FOREST RESEARCH PROJECT PHASE II
IN
THE REPUBLIC OF INDONESIA

The Japanese Evaluation Team (hereinafter referred to as "the Team") organized by the Japan International Cooperation Agency (hereinafter referred to as "JICA") and headed by Dr. Fujio Kobayashi, Chief Adviser, Japan Forest Technical Association, visited the Republic of Indonesia from 26th June to 8th July, 1994 for the purpose of evaluating the Tropical Rain Forest Research Project Phase II (hereinafter referred to as "the Project").

The Team and the Indonesian authorities concerned headed by Prof. Dr. Bambang Soehendro, Director General of Higher Education, the Ministry of Education and Culture, carried out the joint evaluation of the Project and held the Joint Evaluation Meeting in Jakarta, on 6th July 1994.

Through the Joint Evaluation Meeting, both sides agreed to convey to their respective authorities concerned, the results of the joint evaluation referred to in the Summary Report of Evaluation attached herewith.

Jakarta, 6 July, 1994

Dr. Fujio Kobayashi
Leader of the Evaluation Team
Japan International Cooperation Agency,
Japan

Prof. Dr. Bambang Soehendro
Director General of Higher Education
Ministry of Education and Culture,
The Republic of Indonesia

THE SUMMARY REPORT OF EVALUATION
ON
THE TROPICAL RAIN FOREST RESEARCH PROJECT PHASE II
IN
THE REPUBLIC OF INDONESIA

1. INTRODUCTION

The Project has been implemented for five years from 1990 to 1994, based on the Record of Discussion (hereinafter referred to as "the R/D") signed on 22nd December, 1989.

The objectives of the Project are to promote research activities in tropical rain forests at PUSREHUT, and thus to contribute to the sound management of tropical rain forests, in particular, the reforestation and rehabilitation of the tropical rain forest in East Kalimantan, Indonesia, and to support the research activities in forestry by researches from the Bogor Agriculture Institute (IPB), the Gajah Mada University (UGM) and the Mulawarman University (UNMUL).

To attain the above mentioned objectives, the following cooperation areas have been implemented ;

(1) Evaluation of the Forest Site Environment
(2) Inventory of the Forest Ecosystem
(3) Rehabilitation Techniques of the Forest Ecosystem
(4) Inter-areal Studies.

Before the termination of the Project, a joint evaluation team consisting of Indonesian and Japanese members had carried out an evaluation of the Project.

This is the summary of the joint evaluation.

2. INPUT

Results of the evaluation and the conclusion on the input achievement are as follows:

2-1. Japanese Side

(1) Dispatch of Japanese Experts

Thirteen long-term experts have been dispatched. They are team leaders, liaison officers and experts in the fields of forest soil, forest ecology, wildlife ecology and silviculture.

Twenty-five short-term experts in the relevant fields have already been dispatched, and 6 more are being planned.

They have conducted a transfer of techniques in their respective fields to the Indonesian counterpart personnel.

(2) Training of Indonesian Personnel in Japan

Eleven Indonesian personnel have been accepted, and 2 more are being planned for technical training in Japan on Japanese forestry.

The training has been very useful for the trainees in obtaining productive experiences and it has contributed to the successful implementation of the Project activities.

(3) Provision of Machinery and Equipment

Necessary machinery and equipment have been provided. The total number of machinery and equipment granted has a value of 126 million yen. Most of them are well maintained and used intensively for the Project activities. However, some of them need to be repaired or replaced due to severe climate conditions and long time utilization.

(4) Other Financial Assistance

For the effective and smooth implementation of the Project, JICA has supplied a portion of the local cost expenditure for the execution of infrastructures such as the construction of

a demonstration and experimental forest, nurseries, forest roads and so on.

These financial supports have been very effective for the smooth implementation of the Project.

2-2. Indonesian Side

(1) Assignment of Counterpart Personnel and Supporting Staff

Efforts made by the Indonesian side for assigning counterpart personnel, such as project manager, director of PUSREHUT, programme officers and others have been satisfactorily achieved and the number of counterpart personnel corresponding to each field has been sufficiently allocated. In addition to being engaged in part-time research activities in PUSREHUT, most of them have teaching assignments at each university. It is desirable for counterpart personnel to be able to concentrate more deeply in research activities in PUSREHUT.

(2) Land, Buildings and Necessary Facilities

Land and facilities necessary for research and survey, such as project office, field facilities of PUSREHUT and other relevant facilities have been provided for the Project activities.

(3) Local Cost

The project budget has been sufficiently supplied by the Indonesian Government.

2-3. The Joint Committee and the Research Committee

The Joint Committee and the Research Committee have been organized to discuss major issues concerning the Project. Meetings have been held annualy and the annual work plans of the Project have been formulated and approved. The overall progress of the technical cooperation programme has been reviewed and project activities have been monitorred.

3. OUTPUT

The activities of the Project have been carried out in four research areas, i.e. Evaluation of the Forest Site Environment, Inventory of the Forest Ecosystem, Rehabilitation Techniques of the Forest Ecosystem and Inter-areal Studies.

Results of the evaluation and its conclusion are as follows:

3-1. Evaluation of the Forest Site Environment

Two subjects are (1) soil classification and site productivity and (2) change of soil condition induced by swidden cultivation and conservation of the forest site environment.

Basic results of the soil classification and its characteristics in and around the Bukit Soeharto Protection Forest have been obtained. Data on soil characteristics in Acrisol will be helpful information for evaluating the site and its productivity in East Kalimantan. Changes of the soil condition by human impacts have been surveyed in the research on the chemical elements dynamics in soils. Further observation will be needed concerning the various types of human impacts and the recovering processes through vegetation development.

3-2. Inventory of the Forest Ecosystem

Four subjects are: (1) regeneration process with reference to ecosystem disturbances caused by selective cutting, forest fire and swidden cultivation, (2) forest ecosystem function dynamics, (3) forest type classification and dynamics analysis and (4) wildlife ecology.

Many tree species in the Bukit Soeharto Protection Forest have identified, listed and filed in the Herbarium of PUSREHUT. The Herbarium is informative for observing vegetation dynamics in various long-term permanent plots in this project and for education of forest science. Vegetation changes after a forest fire and swidden cultivation have been intensively studied. Net primary productivity and standing crop of soil organic matter in secondary forests and

Alang-alang grassland have been estimated for evaluating the productivity changes by various types of forest fires and swidden cultivation. Long-term monitoring in successional forests after human impacts and non-disturbed natural forests have to be continued for analysing the forest ecosystem dynamics and for conserving bio-diversity.

Mamalian fauna in East Kalimantan has been surveyed, especially in Bukit Soeharto, and the results have been published as the publications of PUSREHUT. Research of terrestrial vertebrates such as birds, reptiles and frogs has been continued. Although a research on insects has been carried out, further research will be needed due to their important role on forest regeneration.

There are various exhibition items in PUSREHUT, such as specimens of mammals, insects and soils, wood samples and photographs of the forest. They are usefull to activate the forest ecosystem research and the bio-diversity conservation in East Kalimantan.

3-3. Rehabilitation Techniques of the Forest Ecosystem

Three subjects are (1) reproductive behavior in tropical tree species, (2) analysis of environmental factors affecting tree growth and tolerance and (3) development of reforestation techniques.

Flowering and fruiting of tropical tree species in the Bukit Soeharto Protection Forest have been observed continuously in relation to their yearly reproductive variation. As for increasing the survival rate and accelerating the growth of planted seedlings, charcoal rice husks have been supplied to the soils of seedling pots and plantations. Growth of seedlings have accelerated markedly through increasing mycorrhiza infection, and these results have been extended to the establishing of a nursery management through PUSREHUT research reports and leaflets. Further technical improvement will be needed.

3-4. Inter-areal Studies

One subject is (1) establishment of an experimental plantation.

Yearly growth measurements on important tree species for timber production have been carried out in line and group plantations. These observations are important for analyzing the growth process of planted trees and will be useful for future studies on silvicultural techniques: weeding, pruning and thinning.

4. OBJECTIVE

According to the R/D, the objectives of the Project are to promote research activities of tropical rain forest at PUSREHUT, and thus to contribute to the sound management of tropical rain forests, in particular, the reforestation and rehabilitation of the tropical rain forest in East Kalimantan, Indonesia, and to support the research activities in forestry by researchers from the three universities (IPB,UGM and UNMUL). The results of the evaluation and its conclusion are as follows:

4-1. Promotion of Research Activities of Tropical Rain Forest at PUSREHUT

The research activities, in general, have been considerably well promoted by much closer cooperation efforts on the Indonesian and Japanese sides. As a consequence, the number of research reports have amounted to 104 which indicates an increase of more than 50% compared to that in phase I, and many of them have been published in scientific journals, annual reports and other publications of PUSREHUT. These publications are widely distributed not only in Indonesia but also overseas. Some of the results have attracted the interest of foresters and the techniques are now applied to the practical management of tropical rain forests in Indonesia.

In order to promote the research activities more effectively and efficiently, the research management system in PUSREHUT should be improved.

4-2. Support of Research Activities in Forestry by Researchers from the three Universities.

Through a cooperation with Japanese experts and the use of the facilities and equipment in PUSREHUT, the researchers from UNMUL have been successfully supported in various ways. Cooperation with the other two universities have not been as satisfactory as was expected.

In regard to the training of Indonesian counterparts in some institutes and universities in Japan, a lot of new techniques and information related to forestry researches have effectively been transferred to the Indonesian counterparts.

5. CONCLUSION AND RECOMMENDATION

5-1. Conclusion

The three main components of technical cooperation i.e. dispatch of Japanese experts, training of Indonesian counterparts in Japan and provision of machinery and equipment have been smoothly implemented by the Japanese side in each of the cooperation fields, as stated in the R/D and the Tentative Schedule of Implementation (hereinafter referred to as "the TSI").

The Indonesian side has provided services to the Project including the allocation of counterpart personnel and the provision of local costs in order to conduct the project activities as stated in the R/D and TSI.

Due to the efforts made by both sides, many research results have been steadily obtained, and research activities have been gradually improved. However, some subjects of cooperation initially planned will remain uncompleted by the end of the present project period.

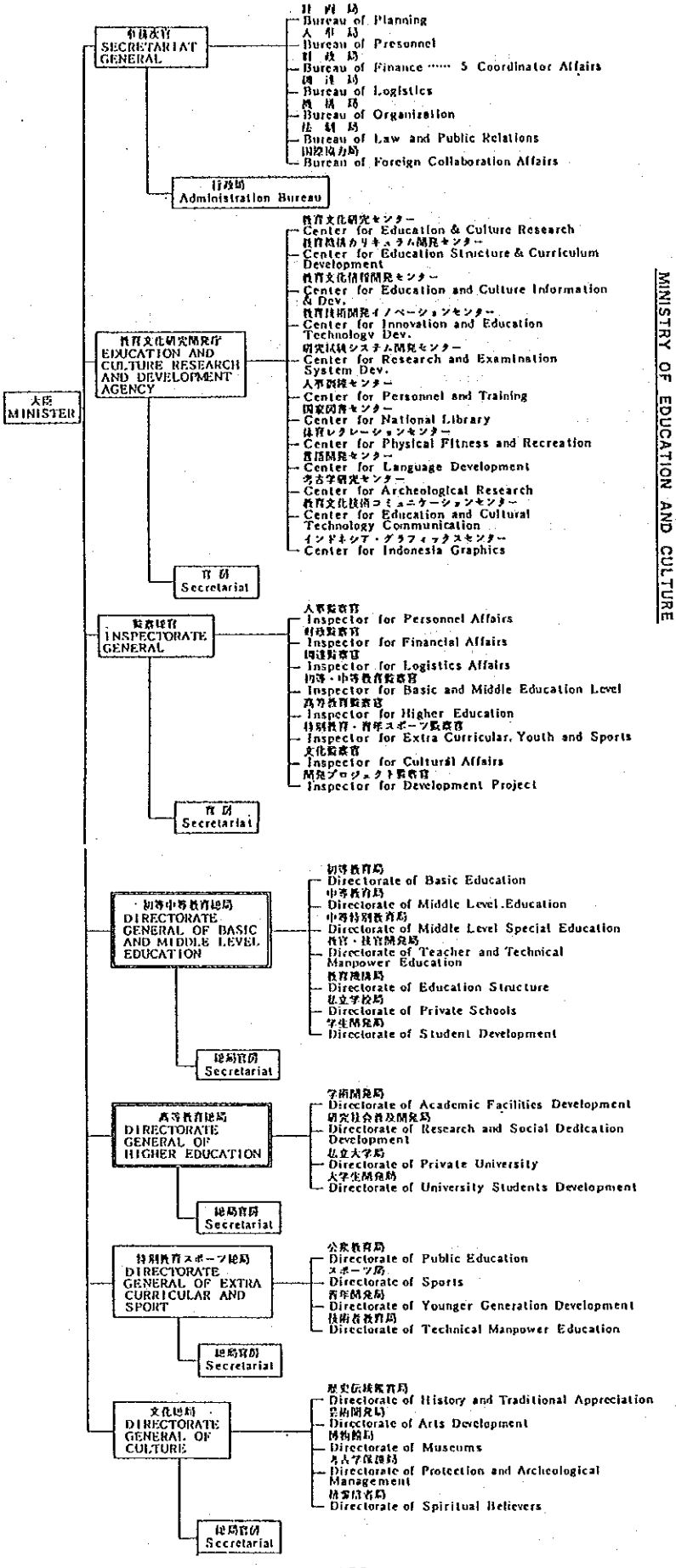
Throughout the joint evaluation procedures, the Indonesian counterparts expressed their wishes for the continuation of the Project. In addition, both sides have discussed the future prospects of PUSREHUT as a central institution of tropical rain forest research in Indonesia as well as in other Asian countries, and such central institution would be realized in such a way so as to undertake cooperative research subjects in PUSREHUT.

5-2. Recommendation

In order to activate its scientific researches PUSREHUT must have a certain number of full-time senior scientists who can play the central role of the laboratories. The quantity and quality of the research personnel in addition to the facilities and equipment are all the major components of any research institution in the world. Furthermore the combination of scientists and equipment should be properly and efficiently organized as the integration of a research unity. Administration and the research management system are believed to be the supporting functions so as to enhance the total research activities by the scientists.

In conclusion, the personnel, facilities, funds and their total management system are to be further strengthened at PUSREHUT.

2　実施機関組織図



教育文化省組織図
MINISTRY OF EDUCATION AND CULTURE

3　評価に関する質問事項・回答

質問に対する回答

1. 回答者名

所属職名	氏　名
教育文化省高等教育総局研究普及開発局長	Prof. Dr. Jajah Koswara
ムラワルマン大学学長代行	Prof. Dr. Riyanto
ムラワルマン大学林学部長	Dr. Soeyitno Soedirman
ムラワルマン大学大学院長	Dr. Bandi Supraptono
ムラワルマン大学教官	Ir. Triyono Sudarmadji
ボゴール農科大学大学院長	Prof. Dr. Edi Guhardja
ガジャマダ大学大学院長	Prof. Dr. Sunardi Prawirohatmodjo
熱帯降雨林研究所長	Dr. Maman Sutisna
熱帯降雨林研究所副所長	Ir. Oman Suherman M. Agr.
熱帯降雨林研究所 C/P（元林学部長）	Dr. Ach. Ariffien Bratawinata
熱帯降雨林研究所 C/P（教官）	Dr. Afif. Ruchaemi
熱帯降雨林研究所 C/P（教官）	Dr. Ir. Mansur Fatawi
熱帯降雨林研究所 C/P（教官）	Dr. Deddy Hadri
熱帯降雨林研究所 C/P（教官）	Ir. R.B. Iskandaryanto
熱帯降雨林研究所 C/P（教官）	Ir. Triyono Sudarmadji
熱帯降雨林研究所 C/P（教官）	Ir. Sri Sarminah
熱帯降雨林研究所 C/P（教官）	Ir. Syahrinudin
熱帯降雨林研究所 C/P（教官）	Ir. Maringan Simbolon

2　回答抄（主要部分）

(1)　研究普及開発局長 DR Gaja Kosware

1.　熱帯林の適正な管理について

ANS.　熱帯林の適正な管理とは「持続ある開発」「環境にやさしい管理」「国家経済開発のために生産的」などを含むものでなければならない。

2.　高等教育のシステムについて

ANS.　IUCはURGEに改変されることになった。URGEについては選定、評価、運営の手続は定められている。

3.　PUSREHUTの研究推進について

ANS.　PUSREHUTについては研究活動を効果的適切に推進できるようにする。そのため主要ポジションについてはFull-timeの職員を配置する。研究者の収入増の方策も検討していく。

4.　プロジェクトの評価について

ANS.　一般的に評価して、75点

6.　PUSREHUTプロジェクトの将来について

ANS.　プロジェクトは継続されることを希望する。その際は大学院教育との関わりが必要と考える。

予算については、大学予算のほかに、外部からの資金も必要である。

(2)　PUSREHUT 所長 DR Maman

（主要部分）

3.　研究の推進について

ANS.　PUSREHUTはムラワルマン大学の林学部の下にあれば自力で運営していくことも、比較的容易である。

（研究所として独立することの不安を云っている）

5.　研究の実施について

ANS.　研究の実施は、土壌、造林、森林生態の面でかなり進展してきている。

4.　若い研究者の育成について

ANS.　現在も8名の若い研究者が参加しているが、さらに予算等の支援を行っていく必要

がある。

6. 若い研究者の育成について

ANS. インドネシア国内、および海外での育成が進展してきている。

7. 教育上のインパクトについて

ANS. 若い研究者には、かなり成果が認められる。

8. プロジェクトの評価について

ANS. 研究施設、研究環境が改善される

進展の認められる分野は森林土壌、樹木生理、野生々物等である。

評点をつければ、70～85点

9. プロジェクトの将来について

ANS. 今後は応用研究、実用研究に力を入れていきたい

カウンターパートの回答（日本での研修について）

日本での研修について

3.1 参加の経験はあるか

あり … 3　なし … 5

3.2 研修の感想を求めたところ

i 研修のテーマ

適正 … 3　不適 … 0

ii 研修のレベル

適正 … 3　不育 … 0

iii 研修の期間

十分 … 2　不十分 … 1

(3) 代表的回答（4例）

A. QUESTIONNAIRE FOR OFFICIALS OF MINISTRY OF EDUCATION AND CULTUR (DGHE)

According to the R/D, objectives of the tropical rain forest project are
(1) to contribute to a sound management of tropical rain forests and,
(2) to facilitate post-graduate training in forestry.
Concernig to the achievement of objectives, would you please give us your answers to following questions ?

CONTENT OF QUESTIONNAIRE

1. On the appropriate management plan of tropical rain forests
2. On the development of higher education system
3. On the promotion of research activities
4. On the present evaluation of the project
5. On the impact of tropical rain forest project
6. On the future plan of the project
7. Other comment

QUESTIONNAIRE

1. On the appropriate management (conservation and development)plan of the tropical rain forest

1.1. Would you please tell us the appropriate management plan of the tropical rain forest ?

Ans. - National plan should cover inventory, property and law
- Unit plan should cover management of manageable unit(size)
- Appropriate management include: sustainability, friendly to the environment and productive for the national economic development

1.2. Would you so kind as to show us your plan and statistical materials on the tropical rain forest management ?

Ans. - Industrial Forest(Agroforestry)manage by government & private
- Conservation/Park Forest manage by government & private
- Protection Forest manage by government only

1.3. Would you explain how the tropical rain forest research project fits into the goverment's tropical rain forest management plan ?

Ans. - National condition/data base
- Production/Silviculture

- Post harvest/Wood Technology
- Marketing

Will be excellent input on developing a sound productive management

1.4. Would you tell us the cooperation among other administrations for the project ?

Universities are responsible for producing HRD of high quality and research product/research collaboration with the users.

1.5. Have you proposed any proposition for the management of tropical rain forest based on research results of PUSREHUT ?

Ans. - Research Result of PUSREHUT are disseminated through different channels:
- Research Institutes
- Faculties of Forestry
- Other institutions(govemment & private)
- Scientists(National & International)

It is fair to say that policy on forestry management taken by Indonesian Government and also used by other countries as well, is in part a contbibution of PUSREHUT.

2. On the development of the higher education system

Would you tell us the following items ?

2.1. The out-line of current state of the higher education system for tropical rain forest research

Ans. - Tropical forest research at DGHE
- Competitive research through fund at university(UNMUL)
- Competitive research.through fund at DGHE(DRSD)

2.2. The situation and role of IUC system in the higher education system

Ans. IUCs located at Selected Universities should be directly involved at the graduate programs, has specific objective, and research programs of high quality.

2.3. Have you made any manual for development of IUC system ?

Ans. Under the IUCs systems which is now develop into URGE(University Research for Graduate Education)manuals are developed for:
- Selection(criteria, procedures etc.)
- Monitoring & evaluation
- Management

2.4. Important assumptions to maintain IUC system

Ans. Assumption to maintain IUC systems are:
- Available maintenance and operation budget
- Available research budget
- Researchers time could be compensate if enough budget is avaialbe
- Linkage with national and international users

2.5. An enlightment activity for tropical rain forest research

No answer.

3. On the promotion of research activity at PUSREHUT

Would you please tell us the following items ?

3.1. Is the organization of PUSREHUT suitable and effective to promote research activity ?

suitable, not suitable

effective, not effective

Improvement of the organization:

Ans. The organization of PUSREHUT suitable and effective to promote research activity.

Improvement of the organization:professional staff, full time staff of the key positions, more active in income generating unit, mote linking within the institution.

3.2. Support on areas of budget, personnel and others

Ans.	Sufficient	Insufficient	Reason
Budget :	–	○	a minimum budget allocation for maintenance and operation
Personnel:	–	○	legal appointment and budget allocation
Others :	○	–	–

3.3. Assingment of stuff and assurance of their ststus and economy

Ans. Through letter of appointment from rector but should be followed by budget allocation.

3.4. The activities of joint commitee and research commitee

sufficient, insufficient

reason

Ans. The activities of joint committee and research committee are sufficient.

3.5. Establishment of priority of research subjects

Ans. Priority of research subject are on:

- Data base updating on natural condition and mapping
- Multi-years research commitment(program & fund)

3.6. Other measures for the promotion of research activity of PUSREHUT

Ans. Multi-years research commitment (program & fund)

- Involvement of more scientist (Graduate students & their advisors)
- Dissemination of information of PUSREHUT activities
- Collaboration other with institutes (Govemment, private and intenational)

4. On the impact of tropical rain forest project

Do you feel this project had positive, nebative or neglegible impact ?

Would you tell us about the impacts of this project ?

4.1. Has there been any educational impacts ?

positive, negative, negligible

(1) How about the educational impacts on the management of other IUC ?

(2) How about the impacts on the education of junior reseachers ?

(3) Other educational impacts

Ans. The educational impacts are positive, shown by the opening of graduate program on Forestry at UNMUL in 1993. The impacts on the management of other IUC is negligible.
The impacts on the education of junior researchers are positive, they want to continue for the graduate program or enrolled on training.
Other educational impacts are also positive, many request for short training come from private institutions

4.2. How about psycological impact ?

Ans. Some psychological impact may occurred to non forestry staff or to other structural units.

4.3. Has there been any political or institutional impact ?
positive, negative, negligible

(1) Did you change the IUC development plan according to the impact of this project ?
(2) Did you change any institution of IUC or higher education system according to this project ?
(3) Did you start any new project as a result of the project ?
(4) Did you increase number of stuff and badget of IUC ?
(5) How about any other political and institutional impacts ?
(6) Have there been any other political and institutional impacts ?

Ans. Political and institutional impact are positive
(1) The IUC development plan is somewhat modified not only because of the impact of PUSRBHUT but also of the other IUC's as well.
(2) The higher education system is not change because of the development of IUC's.
(3) The graduate program (S2) on Forestry at UNMUL was approved by DG in 1992, and new S2 students was enrolled in September 1993.
(4) Budget of IUC is develops through competitive research and through income generation units (contract research, training etc.)
(5) Involvement of private institution, national and international visitors, involvement of PUSREHUT (staff and institution) in national and international event have given a very positive impact politically and institutionally.

4.4. On the effect of this project on other projects
(1) Did you use your experience on this project in planning, implementation and so on of other projects or IUC ?

Yes, No,

(2) If you did, would you give us the following information ?

(a) What was name of new project or new IUC ?

(b) How did you use your experiences ?

(c) How were the results ?

Ans. (1) Yes

(2) a. University Research for Graduate Education

b. Experiences on comparative development of human resources, organization, programs, facilities and linkages.

c. At present the project is just started (effective in September 1994-1999)

5. On the present evaluation to this project

Would you please tell us your evaluation of this project ?

5.1. What items improved ? In which fields did you have success ?

Ans. Number of trained staff, facilities, number of report, published articles, demonstration plots, nursery, field plots, show rooms, linkages, are greatly improved.

5.2. What items did not improve ? In which fields was succes not realized ?

Ans. Organization, leadership and sense of belonging should be improved.

5.3. General evaluation

How would you rate this project on the scale from zero to hundred, where zero is complete failure and one hundred is complete success ?

Ans. My general evaluation of this project is 75(seventy five)

6. On the future plan of this project

6.1. Do you want to continue this project ?

Yes, No,

Ans. Yes, we want to continue this project

6.2. If you want to continue, would you please tell us your future plans to achieve success ?

Ans. In the future the project should be closely linked with the Graduate School in Forestry (UNMUL, IPB, UGM)

6.3. What is important thing to continue the project in future ?

Ans. In the near future it is important to do multi-years research as well as

education

6.4. Are there any public promice of (budget, personnel and so on) for continuation of the project in future ?

Ans. After the public recognized the quality of the work of PUSREHUT, the continuation of the project in the future can be expected through public funds as well as at through competition for funding

6.5. If we can assist your future plans with technical cooperation of Japan, what kind of cooperation would be usefull to you ?

Ans. In the near future technical assistance on tropical rain forest researchers and enough budget support will be still needed.

7. On other comment

Do you have any other comments that you feel would be significant to this evaluation ?

Ans. Dissemination of information of PUSREHUT and linkages with other institution of reciprocal benefits should be strengthen.

Jakarta, July 1, 1994

Director of Research and Community Service Development

DGHE

(Jajah Koswara)

B. QUESTIONNAIRE FOR PROFESSOR

According to the R/D, objectives of the tropical rain forest project are
(1) to contribute to a sound manegement of tropical rain forests and,
(2) to facilitate post-graduate training in forestry.
Concernig to the achievement of objectives, would you please give us your answers to following questions ?

CONTENT OF QUESTIONNAIRE

1. On the appropriate management plan of tropical rain forest
2. On the development of higher education system for tropical rain forest management
3. On the impact of tropical rain forest project
4. On the present evaluation of the project
5. On the future plan of the project
6. Other comment

QUESTIONNAIRE

University: OF MULAWARMAN Your name: Dr. SOEYITNO

1. On the appropriate management (conservation and development)plan of the tropical rain forest

Would you please tell us following items ?

1.1. Your reseach subject on the tropical rain forest
THE GROWTH OF THE STAND RELATED TO:
- FOREST SITE CLASSIFICATION
- YIELD REGULATION

1.2. How your research subject fits into the goverment's tropical rain forest management plan ?
- The growth of Residual stand is the important part to sustain the utilization tropical rain forest.
- Site quality and yield regulation should be considered for the next step to realized sustainable management.

1.3. Application your research results for appropriate management of tropical rain forest
- The length of cutting cycle (Rotation) should be based on varied

condition of forest stand (growth)

- Un-equal size (area=ha) in the yield regulation should be considered (heterogenity of forest potential)

1.4. Socio-economic evaluation of your research results

- Intensive forst management can be applied, it is mean the need of qualified forester also increased
- Envivonmental impact of forest logging - harvesting can be limited and considerable

1.5. Have you done any advice or proposition for appropriate management of tropical rain forest ?

- Yes, especially the application (consideration) of "un equal size yield regulation" in the forest planning.

1.6. Cooperation among other universities, research institutes and public administrations for tropical rain forest research

In East Kalimantan it is necessary to be improved and accelerated, to speed up the realization of sustainable froest management (especially in the year of 2000)

1.7. Your activities on the joint committee and research committiee for PUREHUT project

I was the former PUSREHUT Dircetor, I have participated during the Joint committee as well as Research committee activities (1990-1992)

2. On the development of the higher education system for tropical rain forest research

Would you tell us the following items ?

2.1. How many times did you use PUSREHUT for your research or education of graduate students or junior reseachers ?

for your reseach: One year before my position in PUSREHUT and during my period as Director.

for graduate student: Just start this year

2.2. How many persons (man / month) dispatched to the PUSREHUT ?

graduate student: for my field (subject) will be two graduate students in my field (forest planning and inventory)is two

junior researcher: junior researcher

2.3. Have you had confference with PUSREHUT about their research plan, implementation etc. of dispatched persons ?
Yes, one of above junior staff already sent to Japan for "kenshu-in" in remote sensing. It is necessary to be improved programmes.

2.4. How was research results ?
Good/well implemented

2.4. Has your research been promoted by PUSREHUT project ?
Yes, through the Amnual Report of PUSREHUT - JICA

2.4. How do you think about the degree of achievement of the role as IUC of PUSREHUT, sufficently or not ?
sufficiently, insufficiently
Based of my expeninces, it is not insufficiently implemented and abhievement. The system should be re-formulated under direct UHMUL-management/Forestry Faculty of UNMUL

2.5. Have you developed of IUC system ? Have you idea for improvement of IUC system ?
Yes, it should be re-arrangement. I think it will be more simple and appropriate under direct management of UNMUL as the initial stage of PUSREHUT establishment('80)

2.6. Have you made a manual for IUC management ?
NO, it is decided by the DGHE

2.7. Have you any advice and proposition for promotin of reseach activity of PUSREHUT ?
The management system should be improved and re-organized (see.2.5) and should be more coordinated with other Res. inshhition (including other foreign project in forestry, East kalimantan)
Coordination between ministry of Education and Foresty should be improved.

3. On the impact of tropical rain forest project

Do you feel this project had positive, negative or negligible impact ?
Would you tell us about the impacts ?

3.1. Has there been any technical impact ?
positive, negative, negligible

(1) How about the impacts on development and extension of new technique

for tropical rain forest management ?
Very little, because the result of PUSREHUT's research activities are more emphasized on basic research, on the other hand the forest commuity neet more in the direction of applied research (field problem oriented)

(2) How about other technical impacts ?
PUSREHUT has, espcially on mycorrhiza aspect, but it should be further implemented, followed up with other actions

3.2. Has there been any educational impacts ?
positive, negative, negligible
but very limited

(1) How about the impacts on the development of IUC system ?
There is no attractive impact of it (the system)

(2) How about the impacts on the education of junior researchers ?
There is some impact, but itis shill to be improved, cspecially in the way of transfer of technology of JICA expert.

(3) How about the impacts on the interdisciplinary research ?
It is very usefull, because sustainable managemant can be achieved only through the "multi demensianal approaches"

(4) Other educational impacts
It is hoped that frequency and type of utilization of PUSREHUT facilities can be improved for the future of forestry education and training program.

4. On the present evaluation of the project

Would you please tell us your evaluation of this project ?

4.1. What items improved ? In which field did you have success ?
The last two years coordination and understanding between two forstry project at UNMUL (GTZ and JICA) well improved. Relation with my field it is necessary to improve the existing facilities (Remate sensing-already out of date)
But such technology now plays important role in forestry sector.

4.2. What items did not improve ? In which fields was success not realized ?
The coordination and cooperation between JICA expert and Indonesian

scientist it seem very low intention. But such cooperatinon is the key of successfull of the project. It is cause by the existis system(?) Biotechnology through "mycorrhiza' and tissue culture" was successfull but there are not follow up → practical application

4.3. General evaluation

How would you rate this project on the scale from zero to hundred, where zero is complete failure and one hundred is complete success ? It is very difficult, but frankly I would say that project more or less 70% sccess.

5. On the future plan of this project

5.1. Do you want to continue this project ?

Yes, No,

wilh emphasizing : applied research and education (praoctical) and traning program.

5.2. If you want to continue, would you please tell us your future plans to achieve success ?

* Research program should be based on practical problem in natural forest management (Logged over=residual stand) and man made forest.
* the cooperation and coordination with other institution (forestry related) should be under considered. (cooperatin between Ministry of Education and Forestey)

5.3. What is important thing to continue the project in future ?

* Provided practical equipment for applied research
* Formulaion of research needed urgently and forestry training (human resourees development → Year 2000 = ecolabelling)

5.4. If we can assist your future plans with technical cooperation of Japan, what kind of cooperation would be usefull to you ?

* Strengthen of technical forestry in (for) the practices (concessionary)
* Strengthen the capablity for conducting middle level forestry education and training

6. On other comment

Do you have any other comments that you feel would be significant to this evaluation ?

* Coordinatin between JICA forestry project in Indonesian each other is important component shoud be considered. JICA has varied forestry project attached to different ministry (Public work → PUSDATA (Remote sensing) ; Forest planning, min. Forestry as well as PUSREHUT → attached to DGHE).

Thank you very much for your cooperation !

C. QUESTIONNAIRE FOR DIRECTER OF PUSREHUT

According to the R/D, objectives of the tropical rain forest project are
(1) to contribute to a sound management of tropical rain forests and,
(2) tO facilitate post-graduate training in forestry
Concernig to the achivement of objectives, would you please give us your answers to following questions ?

CONTENT OF QUESTIONNAIRE

1. On the appropriate management plan of tropical rain forest
2. On the development of higher education system
3. On the promotion of research activities
4. On the promotion of education for junior reseachers
5. On the implementation of research
6. On the implementation of education for junior researchers
7. On the impact of tropical rain forest project
8. On the present evaluation of the project
9. On the future plan of the project
10. Other comment

QUESTIONNAIRE(TO DR. MAMAN, PUSREHUT DIRECTOR)

1. On the appropriate management (conservation and development) plan of the tropical rain forest

Would you please tell us following items ?

1.1. The appropriate management plan of the tropical rain forest from view point research and education.
Improvement, of forest productivity should be a highest priority, because the Indonesian forest are to much be conserved.

1.2. Would you be so kind as to show us your plan and statistical materials of the tropical rain forest management ?
Management of the Iodonesian tropical rain forest is on the right way. 64 millions ha managed as production forest.

1.3. Would you explain how the tropical rain forest research project fits into the goverment's tropical rain forest management plan ?
Research projects planning should be created by an intensive workshop attended by the forestry faculty, Ministry of Forestry, and Concessioners.

1.4. Would you please explain a evaluation system of research, especially socio-economical evaluation ?
Intensive workshop/discussion by all parties surrounding the project.

1.5. Would you tell us the cooperation among universities, research institutes and public administrations for this project ?
Cooperation is important with Concessioners and Agencies for Reseach of the Ministry of Forestry in term of project planning and implementation.
As mach as possible consultation with other parties.

2. On the development of the higher education system for tropical rain forest management

Would you tell us the following items ?

2.1. The out-line of current state of PUSREHUT as one of IUC system ?
PUSREHUT prepares space and equipments for graduate research, which supervisor is PUSREHUT staff.

2.2. The role of IUC system in the higher education system
IUC system is aimed to optimize utilization of the equipment and facilities available anywhere where in country. IUC system helps graduate program with limited facilities.

2.3. How do you think about the degree of achievement of the role as IUC of PUSREHUT, sufficiently or not ?
sufficiently, insufficiently
degree (%): The role of PUSREHUT for graduate research is just starting.
The role of PUSREHUT for general research is insuffiently.

2.4. Have you developed of IUC system ?
PUSREHUT has proposed IUC system to be financed by World Bank through the DGHE. It does not yet decided.

2.5. Have you made a manual for IUC management ?
Not yet.

3. On the promotion of research activities in PUSREHUT

Would you tell us following items ?

3.1. Is it possible to manage PUSREHUT independently·?
possible, difficult, impossible.
PUSREHUT will be easier managed under the Fac. of Forestry, because man power is in the faculty.

3.2. If it is difficult or impossible, would you kindly tell us reasons ?
organization, budget, facility, equipment, researcher
and others ( )

／

3.3. Would you show us the organization to promote research activity ?
planning, designing, discussion of result, evaluation, reporting, publishing and so on
Attended by whole Faculty of Forestry staff. Designing should be located in Samarinda .

3.5. The activities of joint commitee and research commitee
They are us able so long the project in PUSREHUT. If the project is stopped, PUSREHUT run without committee

4. On the education of junior researcher

Would you tell us following items ?

4.1. Number of junior researchers attended to research activity (man / month)
8 persons in 1994/1995

4.2. Facilities and equipments for education of junior researchers
very sufficient, sufficient, insufficient
What items are insufficient ?
facility : ／

equipment: ／

others : - lack of supervision by senior researchers.
- lack of financial support.

4.3. Did you make any curriculum and text books for their training ?
No. Because training for the young scientist is in the form of joint research with Japanese expert or senior Indonesian scientist.

5. On implementation of research

Would you tell us following items ?

5.1. Plan and achievement of research subjects

Sufficiently achieved.

5.2. Remained subjects and future plan to solve them

Basic research could be enough. The future research should be more applied research to improve the practical needs.

5.3. Obtained research results

Very sufficiently in the topics of soil survey, basic silviculture, forest ecology, wildlife science, growth and yield.

5.4. Technical transfer to counterparts

Succesfull for soil science, forest ecology, tree physiology, wildlife.

5.5. Report and publication of research results

Reports in complete publications is still insufficiently.

5.6. Hold of seminar and research meeting, and participation to society

More personally sufficiently.

6. On implementation of education for junior researcher

Would you tell us following items ?

6.1. Plan and achievement of education for junior researcher

Training in country and abroad are sufficiently achieved.

6.2. Number of participated junior researchers

3-4 persons in each year.

6.3. Obtained research results

Trainings in Japan more not research activities, but more field and excursions.

6.4. Current state of junior researchers after training

engage in tropical rain forest research : number ( )

engage in other work : number (4)

kind of work education and research.

7. On the impact of tropical rain forest project

Do you feel this project had positive, negative or neglegible impact ?
Would you tell us about the impacts ?

7.1. Has there been any technical impact ?
Positive, negative, negligible

(1) How about the impacts on development and extension of new technique for tropical rain forest management ?
Indirectly, because many finding were basic research.

(2) How about other technical impacts ?
I personally has written a new version of the Indonesian Selective Cutting with Replanting System for natural forest management whole Indonesian forest. But this is not a direct result of the project

7.2. Has there been any educational impacts ?
Positive, negative, negligible

(1) How about the impacts on the management of IUC ?
The project create IUC in Indonesia. But geographically IUC System is not appropricate for PUSREHUT. with exception for groduate students.

(2) How about the impacts on the education of junior researchers ?
Very positive. Many chance for junior researchers to do research.

(3) How about the impacts on the interdisciplinary research ?
Negligible.

(4) Other educational impacts
No other impacts.

8. On the present evaluation of the project

Would you please tell us your evaluation of this project ?

8.1. What items improved ? In which fields did you have success ?
The research facilities is improved. The research climate/situation is improved.
The success field are soils, tree physiology, wildlife science.

8.2. What items did not improve ? In which fields was success not realized ?
Loboradory activity is not improved. Lack of researcher who want active in the loborabory. Many researchers made field research and not in labo.

8.3. General evaluation

How would you rate this project on the scale from zero to hundred, where zero is complete failure and one hundred is complete success ?

70 ～ 80

9. On the future plan of this project

9.1. Do you want to continue this project ?

Yes, No,

9.2. If you want to continue, would you please tell us your future plans to achieve success ?

Research subjects should be planned practical oriented.
PUSREHUT should be openned for other parties.
Consultation with other research institutions.

9.3. What is important thing to continue the project in future ?

No addition loboratory equipments. Long term experts should learn what Indonesia needs. Cooperation with other parties.
Japanese experts and Indonesion staffs should be permanent for 5 yrs.

9.4. Are there any public promise of (budget, personel and so on) for continuation of the project in future ?

Yes, budget from government, personel from the rector, cooperatin from concessioners.

9.5. If we can assist your future plans with technical cooperation of Japan, what kind of cooperation would be usefull to you ?

1. Improvement of univesity froest Bubit Soeharto.
2. Malling research in the area of Concessioners (practical oriented).

10. On other comment

Do you have any other comments that you feel would be significant to this evaluation ?

The Japanese experts should respect Indonesion counterparts. Please do not doninate the laboratory, and discuss what should be a research topics according to Indonesan practical needs.

Thank you very much for your cooperation !

8.3. General evaluation

How would you rate this project on the scale from zero to hundred, where zero is complete failure and one hundred is complete success ?

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9. On the future plan of this project

9.1. Do you want to continue this project ?

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Thank you very much for your cooperation !

D. QUESTIONNAIRE FOR COUNTERPARTS

Content of questionnaire

1. On your research and development activities at PUSREHUT
2. On the training for graduate students, extension officers and others
3. On the training in Japan
4. On the personal impact by Japanese experts
5. On your personal impression on this project
6. Other comment

QUESTIONNAIRE

Your name : Dr. Ach. Ariffen. B Position Lecturer of Forest Facuthy

UNMUL/Reseacher at Pusrebut.

Present research subject : Forest Ecology.

1. On your research and development activities at PUSREHUT

1.1. Have you planned new research or development ?
Yes I have

1.2. What success has been achieved during the project ?
Yes I have

1.3. Have you developed any new forestry techniques ?
Yes I have

1.4. Have you systimized elementary forestry techniques ?
Yes I have

1.5. Are there any problems unsolved still now ?
Impostant problem unsolued was never exact time received budget, always latest;
examples; Period research from Apirl - April (one year), budget come on october, sometimes ganuary.

1.6. Have you done socio-economic evaluation of your research or techniques you have developed ?

No, I have not!

1.7. Have you reported your research results on an official paper or at a scientific society ?
Yes I have

1.8. How many times did you report ?
Four times report fo PUSREHUT

1.9. Would you be so kind as to show results of your activities at PUSREHUT ?

1.10 How many times did you have periodic meeting to examine planning implementation and management of research and development ?
2-3 times a year

1.11. Have you had any meetings to exchange information with other researchers and technologists ?
Yes I have

1.12. Would you rate the degree of achievement on the rank of A, B, C, D ?

2. On training for graduate students, and others

2.1. At PUSREHUT, do you have a training program for graduate students ?
Yes, No. (In case of No, please tell us the reason.)

2.2 Have you had periodic meetings with them ?
Yes I have

2.3. Have you prepared any curriculum and text books in Indonesian for them ?
Yes I have

3. On your training in Japan

3.1. Did you participate in the training in Japan ?
Yes, No
When I studied at Gifu Univ. (1971)

3.2. Would you tell us your impression about the following items ?
(1) Was the selection of the training subject adequate to actual need

of your country ?
adequate, not adequate

(2) Was the technical level adequate for you ?
adequate, not adequate

(3) Was the period of training sufficient for you ?
sufficient, insufficient

4. On the personal impact by Japanese experts while they are on this project

4.1. Did you feel or observe any impacts at this time ?
Yes, I did

4.2. What kind of impacts did you feel ?
Knowlege, experiences experts Impact to Indonesion Researcher or to be on both sides.

4.3. How about any technical impacts ?
For sure

4.4. How about any psycological impacts ?
Positive

4.5. Were there any other impacts that Indonesian you could observe ?
- technical system influences to Indonesian researcher and technical labos.
- to make more communication insight -, and so on.

5. On your personal impression on this project

5.1. What do think about this project ?
Very good

5.2. Is this project succesful or not ?
Successful, unsuccessful

5.3. Do you want to continue your work on this project ?
Yes, No,
Reason:

5.4. Have you any plan for the future of this project ?
Yes I have

5.5. Have you any need for technical cooperation of Japan ?
Yes I have

5.6. Do you have any other comment ?
No, I have not!

Thank you very much for your cooperation !

4　終了時評価調査表

案件名	(和)熱帯降雨林研究計画（フェーズⅡ）
	(英)The Tropical Rain Forest Research Project (PhaseⅡ)
供与国	インドネシア国
協力期間（R／D協定上）	1990年1月1日～1994年12月31日（5年）
事業分野	センター ／ 保険医療 ／ 人口家族 ／ (農林水産業) ／ 産業開発
技術協力分野	(研究開発) ／ 技術普及 ／ 人材育成
相手国実施機関	教育文化省高等教育総局
エバリュエーション調査団	（担当）　（氏名）　（所属） 団長・総括　小林富士雄　日本林業技術協会顧問 森林経営　宮川　秀樹　林野庁指導部計画課海外林業協力室課長補佐 林業研究　森川　靖　農水省森林総合研究所生物環境部植物生態科長 林業教育　矢幡　久　九州大学熱帯農学研究センター教授 計画評価　大橋　一良　JICA林業水産開発協力部林業技術協力投融資課 目的・評価　鈴木　進　海外林業コンサルタンツ協会
エバリュエーション調査実施日	1994年6月26日　～　1994年7月9日　(14日間)

評価結果総括	
(1)　目標達成度	相当程度達成している。
(2)　案件の成果	当初の目的・目標を相当程度達成しているが、この間学問の進歩も著しく、現時点で判断すれば、協力の道のりはまだ先があるといえよう。
(3)　自立発展性の見通し	過去に行った協力レベルとインドネシア全体の研究レベルとのギャップがあり、自立発展には、もう少し年月を要するところである。
(4)　フォローアップの必要性	次期調査団の検討事項

Ⅰ．協力実施プロセス

1．要請の内容と背景	熱帯降雨林の健全な管理経営、なかんずく東カリマンタンにおける熱帯降雨林の再生に貢献するためＰＵＳＲＥＨＵＴにおける熱帯降雨林研究を促進し、同時にＩＰＢ、ＵＧＭ、ＵＮＭＵＬの研究者の研究活動を支援することを目的としている。
2．協力実施プロセス	
(1) 要請発出	1989年５月　日
	1990年１月26日 ～ 1990年２月23日 (29日間)
	1990年２月10日 ～ 1990年２月23日 (14日間)
	1990年３月19日 ～ 1990年３月27日 (９日間)
(2) 長期調査員	
(担当／氏名／所属)	佐藤　明　農林水産省森林総合研究所
	谷本　文夫　〃
	須崎　民雄　九州大学農学部教授
(3) 計画打合せ	1990年７月25日 ～ 1990年８月９日 (16日間)
(担当／氏名／所属)	団長　小林　一三　農水省森林総合研究所森林生物部長
	造林　小林　繁男　農水省森林総合研究所森林環境部立地評価研究室長
	森林生態　斉藤　昌宏　農水省森林総合研究所森林環境部群落生態研究室長
	業務調整　鈴木　忠徳　JICA林業水産開発協力部林業開発課
(4) 巡回指導	1993年１月18日 ～ 1993年１月31日 (14日間)
(担当／氏名／所属)	団長　金子　詔　林野庁指導部研究普及課長
	造林　河原　輝彦　農水省森林総合研究所企画調整部海外森林環境変動研究チーム長
	森林生態　田中　永晴　農水省森林総合研究所森林環境部立地環境科主任研究官
	業務調整　芹沢　利文　JICA林業水産開発協力部林業技術協力投融資課
(5) 巡回評価	1993年11月28日 ～ 1993年12月10日 (13日間)
(担当／氏名／所属)	団長　三島　征一　林野庁指導部計画課海外林業協力室長
	林業研究　森川　靖　農水省森林総合研究所森林環境部植物生態科長

	事業計画／業務調整　本郷　豊　JICA林業水産開発協力部林業技術協力投融資課長 林業教育　丹下　豊　東京大学農学部林学科助手
3．協力実施過程における特記事項	本件協力は日本のテレビで何回も紹介されるなど、世界の注目を集めるようになっている。
4．他の協力事業との関連性	日本政府は、熱帯降雨林研究センター建設（研究本館１棟・エネルギー棟１棟・シェードハウス１棟・大学演習管理棟１棟・大学演習林管演習棟などの施設）に関し、1979年度無償案件（E／N1979年11月１日、引き渡し1981年３月15日）として15億円の供与を行った。 また、熱帯降雨林研究センター拡充（研修施設の建設・教育機材の供与）についても1986年度無償案件（E／N1987年３月19日、引き渡し1988年３月15日）として2.4億円の供与を行った。

Ⅱ．目標達成度

プロジェクト概要	指　　標	実　　績	重要な外部条件
〔開発目標〕 熱帯降雨林の適正なる管理・経営に寄与する。	持続性のある林業開発へ向けて、優れた人材を多数供給する。	毎年250名の学生が林学部へ入学し、その大部分が卒業生として巣立っており、それぞれの分野で活躍している。1993年には大学院修士課程が設けられるまでに充実している。	JICAおよびGTZの協力は必要不可欠であったと考えられる。 教育文化省の理解と情熱が認められる。
〔案件目標〕 熱帯降雨林に関する研究活動の推進を図る。	次の４つの研究分野が具体的に示されている。 1．立地環境の評価 2．森林生態系の解析 3．森林生態系の再生技術 4．分野間の研究	４分野のそれぞれにおける活動はめざましいものがあり、インドネシア国内はもちろん林業関係の各国も注目している。	JICAによる協力は必要不可欠のものであったと考えられる。 教育文化省の理解と情熱がプロジェクト推進に大きくあずかっている。
〔アウトプット〕 研究者の育成と研究施設の充実・向上	1．研究レポート 2．研究者の数と質 3．演習林研究施設の充実 4．PUSREHUTマネジメントの向上	1．研究レポートの総数は108件（予定を含む）あり、フェーズⅠと比して、おおむね50%増である。 2．研究者の総数は76名（うち博士19名、修士33名）おり、着実に充実している。 3．演習林においては苗畑新設、林道増設、人工林試験地増加など、その充実は目をみはるものがある。 4．PUSREHUTは、常駐研究者の増、管理部門職員の増、展示室の新設など向上が顕著である。	同　上
〔活　動〕 東カリマンタンは熱帯降雨林地域として有名であり、近年林産業の振興も著しい。この熱帯降雨林のメッカといえる東カリマンタンにあるムラワルマン大学構内に建設されたPUSREHUTをIUCとしてUNMUL、IPB、UGMの３大学により共同研究に利用し、熱帯降雨林研究の推進を図ってきた。	〔インプット〕 1．JICAにより長期・短期の専門家；研究機材供与；カウンターパート研修の実施；ローカルコスト負担事業の実施などが行われた。 2．UNMUL、IPB、UGMから研究者の参加；PUSREHUTとブキットスハルト演習林の活用；研究予算などのローカルコストの支出があった。	1．JICA（現在までのみ） 長期専門家　13名、　短期専門家　25名 機材供与数　125,586千円 カウンターパート研修　11名 ローカルコスト負担　62,425千円 2．インドネシア 研究課題数（５年間）　95課題 PUSREHUT職員数（1994年）　44名 ローカルコスト負担　97,182千円 以上が主なものである。	同　上

Ⅲ．案件の効果

効果の内容 / 効果の広がりと受益者	技術的インパクト	制度的インパクト	経済的インパクト	社会文化的インパクト	環境的インパクト	その他インパクト
プロジェクト・レベルのインパクトと受益者	研究機材の使用法、研究レポートの作成法。 4分野108件の研究レポートなどがPUSREHUTの実績として蓄えられた。	林学部教官の数と質が向上し、林学教官の評価全体が向上している。 大学院マスターコースが設置され、UNMULの地盤は着実に上昇している。	職員の雇用増大、研究予算の増加が明確である。	UNMUL５学部中林学部の進展はめざましいものがある。	演習林5000haの適正管理はUNMUL林業関係者の誇れるものである。	PUSREHUTの名声は世界的なものとなる可能性がある。
セクターレベルのインパクトと受益者	プロジェクト参加以外の研究者さらに学生へと波及していくことになる。	UNMUL林学の教官、学生に有形、無形の利益を与えている。	教官および学生は、従前の経費のまま質の高い研究学習が可能となってきた。	他学部も真剣に発展向上に取り組んでいるので、UNMUL全体の向上発展につながるものと考える。	東カリマンタンの低地林の残存が少なくなった今、大学演習林は林学・林業関係者の財産といってよい。	インドネシア国内および国外の林業研究者の活躍の場としての発展の可能性が増大しつつある。
地域へのインパクトと受益者	UNMUL林学部の名声が高まりつつあり、カリマンタンあるいはインドネシア全体の利益へとつながる。 なお、教育・研究の成果は長い目で見る必要がある。	東カリマンタン、サマリンダの発展と歩調の一致したものとなっている。	教官による民間研究への参加指導、質の向上した学生が職域に参加しつつある。	カリマンタン全体ではサマリンダが教育の中心的地位を確立しつつある。	将来的には、条件の好転さえあれば、森林再生の道は大きく広がると考える。	PUSREHUT大学演習林は、整備の方法いかんでは林業関係者はもちろん、一般の人々の訪問を大幅に増大させることも可能。
効果発生およびその広がりの要因（予期した効果が発生しない場合の理由を含む）	関係者の努力と熱帯林に世界の目が向けられていることが大きい。 JICAによる適切な協力が投入されている。	JICAおよびGTZによる協力が相互によい影響を与え合ってきた。	熱帯降雨林に関する林業・林学への世の中の期待が高まったこと。	JICA、GTZの協力なしには現状到達はあり得なかったと考える。	ブキットスハル大学演習林5000haの低地林保存の価値は大きい。その最大の貢献はJICAプロジェクトによるものである。	よき指導者ができることである。

Ⅳ．自立発展の見通し

1．組織的自立発展の見通し	
(1) 実施機関存立への政策的支援の有無	ＩＵＣであるため、世銀資金の本プロジェクトへの配分があり、そのため1987年以降研究費の確保が可能であった。 一方、管理費については、教育文化省およびムラワルマン大学当局の理解協力により確保されてきた。
(2) 管理運営体制	ＰＵＳＲＥＨＵＴの運営は、所長と２名の副所長、６研究室長が責任を持つ体制となっており、さらに研究員、管理要員が確保されている。ただし、研究員については各大学（ＵＮＭＵＬ、ＩＰＢ、ＵＧＭ）の教官の身分であるため、専任研究員ではない。
(3) 組織の改廃	㊀ ／ 無 （改廃理由とその効果） ＩＵＣとしてスタートし、昨年度まではそのとおり運営されたきてが、イ国ですべてのＩＵＣが再検討の結果、ＵＲＧＥへ発展的、解消することとなった。 今年度ＩＵＣとしての運営は消滅し、よってＩＰＢ、ＵＧＭの参加は行われていない。
2．財務的自立発展の見通し	
(1) 必要経費調達の見通し	来年度以降の研究費確保は、ＰＵＳＲＥＨＵＴがＵＲＧＥとして認められるかどうかによって大きく差が出る。ＵＲＧＥとしてＰＵＳＲＥＨＵＴが認められるためには、ＪＩＣＡの協力の有無、その協力のなかで大学院レベルの教育部門の協力が行われるかどうかが大きな要因となりそうである。
(2) 自主財源による費用回収状況	トレーニングセンター、セミナールーム、演習林宿泊施設、土壌分析機器などの利用料による収入はあるが、金額は全体予算の３％程度にすぎない。今のところ考えられない。
(3) その他経費の調達	
(4) リカレント・コスト負担の必要性及び妥当性	フェーズⅡのレベルの研究をムラワルマン大学が存続していくためには、①新しい林業研究プロジェクト（大学院レベルの教育も含むもの）を実施するか、または②過去のＪＩＣＡプロジェクトで行った実績レベルのローカルコスト負担相当のコスト負担が必要であろう。

3．物的・技術的自立発展性の見通し	
(1) 移転技術の内容および技術レベルの適正度	個々の専門分野での技術移転は目標どおりに行われた。ＤＲ、ＭＳｃなどの数的増大は今後も続くものと考えるが、研究報告のレベルの向上には相当の年月を要するであろう。
(2) 要員配置況	ＵＮＭＵＬ教官の併任を問題にしなければ、従前の規模の配置は可能であろうが、その際もＵＲＧＥのプロポーザルが認められるかどうかは重要ファクターとなる。
(3) 技術の定着状況	現状の技術レベルは十分なレベルからはまだ距離があるので、定着とともにレベル向上がより一層重要である。
(4) 後継者の育成計画	ＵＮＭＵＬ教官には年々新しく若い人が参加してきており、研究・教育のレベル向上は十分可能性がある。
4．その他管理運営上の制約要因	世界的にみて、研究および研究機材の進歩は早い。十数年前の古い機材にこだわることは、熱帯林研究全般から考えて、得策ではない。廃棄処分について検討する必要がある。また研究成果の著作権、知的所有権について、現在問題になっていないが、検討を要する。

Ⅴ．フォローアップの必要性

1．協力期間延長の要否	(要)／不要 （理　由） インドネシア側（教育文化省およびムラワルマン大学当局）はＪＩＣＡ協力の存続を強く希望している。
2．フォローアップの内容と方法 (1)　フォローアップの必要な分野 (2)　フォローアップの内容 (3)　フォローアップの所要期間 (4)　期待される効果	上記１に関連して、インドネシア側は大学院レベルの教育への協力を含めるよう強く希望している。 さらに、研究・教育のレベルが向上し、ＵＮＭＵＬ林学部は、ＩＰＢ、ＵＧＭのレベルに迫っていくであろう。その際、熱帯降雨林の再生を得意分野として持つこととなろう。

5　終了時評価結果集約表

評価レベルⅠ		評価レベルⅡ						
評価項目（重要度のウェイト）	評点	評価項目（重要度のウェイト）	評価基準（評点）					標準点
			きわめて良好な水準 ×1.0 (4)	良好な水準 ×0.75 (3)	可もなく不可もない水準 ×0.50 (2)	不満足な水準 ×0.25 (1)	きわめて不満足な水準 ×0.0 (0)	
1．目標達成度 (50)	42.5	(1) 上位計画との整合性 (15)		11.25				85.00
		(2) 案件目的の達成状況 (25)		18.75				
		(3) アウトプットの達成状況 (20)		15.00				
		(4) 日本側インプットの達成状況 (25)	25.0					
		(5) 相手国側インプットの達成状況 (15)	15.0					
2．案件の効果 (20)	17.5	(1) プロジェクトの効果の内容 (50)	50.0					87.50
		(2) 効果の広がりと受益者 (30)		22.50				
		(3) その他のインパクト (20)		15.00				
3．自立発展の見通し (30)	15.8	(1) 組織的自立発展性 (25)			12.50			52.50
		(2) 財務的自立発展性 (30)			15.00			
		(3) 物的・技術的自立発展性 (35)			17.50			
		(4) 管理運営上の制約的要因 (10)		7.50				
総合点	75.8							

注：評価レベルⅠおよびⅡの評価項目における重要度のウェイトは模式的な例を示すものである。

6 Table of Research Proposals by Year

1. Accepted Research Proposals for 1990/91.

No.	Research Area	Name of Researcher	University	English title of research proposal
1	I-1-A	Ir. Syarif Effendi	UNMUL	General characteristics and productivity level of soil at mesozoic metamorphic ragion in Pasir, East Kalimantan
2	I-2-A	Dr. Daddy Ruchiyat Dr. Abubakar M. Lahjie	UNMUL	Development of soil properties and productivity in different succession stages of swidden cultivation system of Dayak Kenyah in East Kalimantan
3	I-2-B	Dr. Oteng Haridjaja	IPB	Effect of burnt forest and crops to erosion and surface run-off in East Kalimantan
4	II-1-A	Dr. A. Ariffien B.	UNMUL	Timber stand improment (TSI) on logged over Dipterocarps and after forest fire in Taman hutan Raya Bukit Soeharto, East kalimantan
5	II-1-A	Ir. Paulus Matius	UNMUL	Study of regeneration process under the different selaetive conditions
6	II-2-C	Dr. B. D. A. S. Simarangkir	UNMUL	Litterfall and decomposition process in tropical rain forest at Bukit Soeharto, East Kalimantan
7	III-2-A	Dr. D. Murdiyarso	IPB	Ecophisiological studies of tropical rain forest in East Kalimantan
8	II-3-A	Ir. M. Raimadoya	IPB	Characterization of SAR image by distributed target method

9	II-4-B	Dr. Hadi Alikodra	IPB	Research on wildlife ecology. The ecology of primates in East Kalimantan
10	III-2-A	Dr. Wawan Kustiawan	UNMUL	Drought tolerance and water use efficiency of Dipterocarps seedling.
11	III-3-B	Ir. Mubarizi Arifin	UNMUL	Controlling of seedling growth for the stock in large scale plantations
12	IV-1-B	Dr. Suhardi Ir. agus Darmawan	UGM UNMUL	Mycorrhiza formation on medium light intensity of Dipterocarpaceae planted in Bukit Soeharto
13	III-2-B	Ir. Soewarno H. Cs	UGM	Study on the relationship between weeding intensity and growth of Dipterocarpaceae seedling on the logged over area
14	III-3-A	Drs. Soetedjo Ir. Rita Diana	UNMUL	Technical study of cutting on the dipterocarps
15	IV-1-A	Dr. J. Siahaya	UNMUL	A study on species of rattan plantations among the Dipterocarps forest and its potency in Kecamatan Bungan, East Kalimantan

・Recapitulation ; Research Area

I	3
II	5
III	5
IV	2
Total	15

・所属大学別研究者数

UNMUL・・・	10
IPB・・・・・・	4
UGM・・・・・	2
計	16

（注：２大学講師による共同研究１件あり。）

2 Accepted Research Proposals for 1991/92.

No.	Research Area	Name of Researcher	University	English title of research proposal
1	I-1-B	Soeyitno Soedirman	UNMUL	Preliminary study on the potential land capability of tropical rain forest in East Kalimantan.
2	I-1-C	Syarif Effendi	UNMUL	Studies on ground water behaviour in primary forest, secondary forest and alang-alang grass in the education forest Bukit Soeharto, East Kalimantan.
3	I-1-B	Daddy Ruchiyat	UNMUL	Site matching studies of three tree species for plantation.
4	I-2-C	Oteng Haridjaja	IPB	Erosion mapping by using remote sensing imagery; A case study in forest area in Eastern Borneo.
5	II-1-A	Paulus Matius	UNMUL	Regeneration process of forest affected by fire and swidden cultivation.
6	II-2-C	Hadi S. Alikodra Abd. Haris Mustari	IPB	Studies on ecology and conservation of Bekantan (Nasalis Larvatus Wurmb 1781) in the protection forest of Bukit Soeharto, East Kalimantan.

7	II-4-B	Ch. Soeyamto	UNMUL	Ecological studies on rats in Bukit Suharto protection forest, East Kalimantan.
8	II-3-A	M. A. Raimadoya	IPB	Textur classification of forest mosaic with first order statistics.
9	III-3-B	Rita Diana	UNMUL	Controlling of seedlings growth for plant supplying in in large scale plantation.
10	III-2-A	Wawan Kustiawan	UNMUL	Effect of water strees and shading on photosynthesis and transpiration of Dipterocarps seedlings.
11	III-2-A	Kadar Soetrisno	UNMUL	Evaluation of the Interaction of two environmental factor (Light and Nitrogen) on the growth of some Dipterocarps seedlings.
12	II-1-A	A. A. Bratawinata	UNMUL	Maintenance of residual stand in the logged over Dipterocarp forest affected by fire at National Park Bukit Soeharto, East Kalimantan.
13	III-3-A	Sukartiningsih	UNMUL	Studies on sterilization of explant and culture media in tissue culture work for some Dipterocarp species.
14	III-2-B	F.X. Dwisutanto	UNMUL	Studies on relation between enviromental condition and growth of Shorea Laevis and S.Leprosula in East Kalimantan.

15	III-2-B	Mansur Fatawi	UNMUL	Photosynthesis, respiration and growth of Tengkawang (Shorea Pinanga and S.Gisbertsiana) seedlings under different light intensities.
16	III-3-C	Suhardi	UGM	Growth of Shorea Smithiana after inoculation with mycorrhyzae, fertilization with animal manure and fertilization with natural phosphat in Bukit Soeharto.
17	III-2-B	Daniel Murdiyarso	IPB	Photosynthetic response to environmental variables of pioner species and their relevance to the tropical rain forest dynamics.

・Recapitulation ; Research Area / Accepted

I	4
II	5
III	8
IV	0
Total	17

・所属大学別研究者数

UNMUL	12
IPB	4
UGM	1
計	17

3 Accepted Research Proposals for 1992/93.

No.	Research Area	Name of Researcher	University	English title of research proposal
1	I-1-A	Syarif Effendi	UNMUL	Research on soil distribution on pattern in demonstration forest at Bukit Soeharto, East Kalimantan
2	I-1-B	Daddy Ruhiyat	UNMUL	Estimation of nutrients need of Eucalyptus Deglupta forest stand and evaluation of soil pontensial in the plantations area at PT. ITCI, Balikpapan
3	I-1-C	Oteng Haridjaya Oman Suherman	IPB UNMUL	The influence of burning and location of the slope to soil properties and the growth of Acacia Mangium
4	II-1-A	Achmad Delmy	UNMUL	Ecological study on buried seeds in forest floor and their relation to the forest succession processes
5	II-1-A	Paulus Matius	UNMUL	Regeneration process with reference to ecosystem disturbance caused by forest fire and swidden cultivation
6	II-1-A	Muchlis Rachmat Dadang Imam Ghozali	UNMUL	Logging damage density and specieses of commercial tree on residual stands after logging activities
7	II-1-A	Ch. Soeyamto	UNMUL	Intensity attackins by termite to the Eucalyptus Deglupta blume of different ages in PT. ITCI, Pasir district, East Kalimantan

8	II-3-A	Risman Situmeang	UNMUL	The applications of geographic information system for selection timber estate location
9	II-1-A	Soeyitno Soedirman	UNMUL	Study on the characteristics of logged over forest stand under different logging unit system in East Kalimantan. (Case study in PT. ITCI and PT. Kiani Lestari)
10	III-2-A	Soewarno Hasanbahri	UGM	Study on phenology of some main species and endangerous species of trees in Bukit Soeharto areas, East Kalimantan
11	III-3-B	Rita Diana	UNMUL	Follow up study on some Dipterocarps seedlings planting after controlled in the nursery
12	III-2-B	Maman Sutisna	UNMUL	Establishment of thinning method for the industrial plantation stand of Albizia, Eucalyptus and Mangium to improve land productivity
13	III-3-C	Suhardi	UGM	Mycorrhiza formation and growth of Shorea Seminis after using charcoal and rockphosphate in Bukit Soeharto
14	III-2-A	Kadar Soetrisno	UNMUL	Effect of shading and dryness on the leaf structure and Photosynthesis of some Dipterocarp seedlings
15	II-2-B	Mubarizi Arifin	UNMUL	Impact of forest fire to some hidrological and microclimatological aspects in Bukit Soeharto forest area
16	IV-1-A	Mustofa Agung S.	UNMUL	Planting trial and growth monitoring of Tengkawang in research forest Lempake; Preliminary effort of the social forest development in East Kalimantan.

17	II-4-A	Hadi S. Alikodra Abd. Haris Mustari	IPB	Study on ecology and conservation of proboscis monkey in Mahakam river delta, East Kalimantan
18	III-2-B	Mansur Fatawi Marjenah	UNMUL	Effect of gap opening on Macaranga stand to the rate of photosynthesis, transpiration and growth of Dipterocarps seedlings in Bukit Soeharto forest
19	III-2-A	Daniel Murdiyarso	IPB	Mesaurement of plant water relation parameters of several Dipterocarpaceae and fast growing species using pressure volume technique.
20	II-3-A	M. A. Raimadoya	IPB	Unit texture verification of forest land covering by SAR STAR-1 image.

・Recapitulation ; Research Area / Accepted

I	3
II	9
III	7
IV	1
Total	20

・所属大学別研究者数

UNMUL・・・15
IPB・・・・・・4
UGM・・・・・・2
計 21

（注：２大学講師による共同研究１件あり。）

4 Accepted Research Proposals for 1993/94.

No.	Research Area	Name of Researcher	University	English title of research proposal
1	I-1-B	Syarif Effendi	UNMUL	Relationship between soil texture and soil hardness in demonstration forest at Bukit Soeharto.
2	I-2-B	Daddy Ruhiyat	UNMUL	Effect of some land preparation techniques on the properties of podzolic soils and growth of some plantation forest species in Sebulu, East Kalimantan.
3	II-1-A	Achmad Delmy	UNMUL	Relationship between floristic composition of pioneer species and soil condition in secondary forest at Bukit Soeharto.
4	II-1-A	Paulus Matius	UNMUL	Study on stand structure and site characteristics of Schima wallichii (DC) Korth (Puspa).
5	II-4-A	Fadjar Pambudhi	UNMUL	The dynamics of logged over forest structure and efforts to increase it's quality with a silvicultural treatment.
6	II-3-A	M.A. Raimadoya	IPB	Navigation on global positioning system (GPS) on small format of aerial photographs.

7	II-4-A	Candradewana Boer Ecep Iskandar	UNMUL	Study on wild birds communities at selective logging operation forest in Kalimantan rain forest.
8	II-4-B	Hadi S. Alikodra	IPB	Study of food and feeding behavior of Maroon langur at Bukit Soeharto protection forest.
9	III-1-A	Soewarno Hasanbahri	UGM	The phenological studi and development of natural regeneration of Shorea Ovalis and Eusideroxylon Zwageri in PT. Inhutani II, Balikpapan.
10	III-2-A	Kadar Soetrisno	UNMUL	Study on effect of shading and drought to physiological characteristics of some Dipterocarp seedling.
11	III-2-B	Deddy Hadriyanto	UNMUL	Water relation of some Dipterocarp trees plantation.
12	III-3-C	Soemardi	UGM	Identification of agents responsible for nitrogen fixation in tropical rain forest
13	IV-1-A	Soeyitno. Soedirman	UNMUL	Estimation of mortality rate of Leda(Eucalyptus deglupta) using 'Basal Area Ratio' method.
14	IV-1-A	Maman Sutisna	UNMUL	Experiment of selective liberation combined with enrichment planting to rehabilitate burnt logged over Dipterocarp forest in the demonstration forest of the PUSREHUT-JICA. (1st of 5steps)

15	IV-1-A	Mustofa agung Sarjono	UNMUL	Distribution of species producing non-timber forest products of the primary & logged-over forests in Bukit Soeharto national forest.
16	IV-1-B	Suhardi	UGM	Mycorrhiza maintenance and accelerating growth methods in 3 and 5 years plantation of Dipterocarps in Bukit Soeharto.

・Recapitulation ;

Research Area	Accepted
I	2
II	6
III	4
IV	4
Total	16

・所属大学別研究者数

UNMUL・・・	11
IPB・・・・・・	2
UGM・・・・・・	3
計	16

5 Accepted Research Proposals for 1994/95.

No.	Research Area	Name of Researcher	University	English title of research proposal
1	I-1-B	Mubarizi Arifin Darul Aksa	UNMUL	Evaluation of land preparation for timber estate establishment; A view from erosion control and nutrient cycling.
2	I-2-C	Triyono Sudarmadji	UNMUL	Study on stabilization of denuded hillside land using vegetation method for prevention and control of erosion.
3	I-2-C	Sri Sarminah	UNMUL	Study on surface run off and erosion in area of after swidden cultivation Bukit Soeharto forest.
4	II-1-A	Hastaniah	UNMUL	Habitat and growth of Ulin(Eusideroxylon zwageri) in a low land area of East Kalimantan.
5	II-2-C	Daddy Ruhiyat	UNMUL	Nutrient circulation model of logged-over mixed Dipterocarps forest at Bukit Soeharto, East Kalimantan.
6	II-2-C	Syahrinudin	UNMUL	Variability of nutrient fixed in the bole of Acacia Mangium willd stand of six different provenances.
7	II-4-B	Ecep Iskandar	UNMUL	Population analysis of soil microorganisms under forest stand with different ages at PT. ITCI.

8	II-4-B	Ch. Soeyamto	UNMUL	Study on variety of primates wild life species in Bukit Soeharto national forest, East Kalimantan.
9	III-1-A	Ripto Permono	UNMUL	Long period storage of Meranti(Shorea sp.) tree seeds at silviculture laboratory of PUSREHUT, Samarinda.
10	III-2-A	Deddy Hadriyanto	UNMUL	Diurnal effects on atomatal opening (conductance) and transpiration of Shorea Laevis(Bangkirai) and S. Parvifolia (Red-meranti) under different light intensity.
11	III-2-A	Kadar Soetrisno	UNMUL	The effect of amount of soil water on the leaf water potensial of some Shorea seedlings.
12	III-2-B	Mansur Fatawi	UNMUL	Plantation trial establishment of the pioneer species of Schima walichii on the light and heavy degraded area at Bukit Soeharto forest, East Kalimantan.
13	III-3-C	Marjenah	UNMUL	Study on a variation in ecophysiological characteristic of Shorea leprosula and Shorea parvifolia.
14	IV-1-A	A. A. Bratawinata	UNMUL	Survival and growth of Ulin(Eusideroxylon zeageri T et B) plantation on the three sites planning (Valley, Slope and Ridge) in the secondary forest area at Bukit Soeharto.
15	IV-1-A	Maman Sutisna	UNMUL	Effect of canopy gap size, planting spacing, and species mixing on the growth of the plantation of Dipterocarp species in demonstration forest of JICA at Bukit Soeharto.

16	IV-1-A	Afif Ruchaemi	UNMUL	Growth analysis base on light intensity and site variation of 15 Dipterocarpaceae species in demonstration plot Bukit Soeharto.
17	IV-1-B	Oman Suherman	UNMUL	Technique and economic trial of growth increase of Shorea with added charcoal rice husk to plantation.
18	IV-1-B	Enih Rosamah	UNMUL	Effect of the wood charcoal of Albizia, Leucaena and Macaranga on the growth of Shorea leprosula seedling.

・Recapitulation ; Research. Area

I	3
II	5
III	5
IV	5
Total	18

・所属大学別研究者数

UNMUL・・・	18
IPB・・・・・・	0
UGM・・・・・・	0
計	18

7 Review of the First Phase and Proposal
of the Second Phase of PUSREHUT-JICA PROJECT

REQUEST FOR THE TECHNICAL AND FINANCIAL ASSISTANCE
BY JAPANESE GRANT AID PROGRAMMES

REVIEW OF THE FIRST PHASE AND PROPOSAL OF THE SECOND PHASE OF PUSREHUT - JICA PROJECT (FISCAL YEAR 1990-1994)

GOVERNMENT OF INDONESIA
MINISTRY OF EDUCATION AND CULTURE
DIRECTORATE GENERAL OF HIGHER EDUCATION
1989

CONTENTS

PREFACE

As stipulated in the Technical Cooperation Agreement between the Japan International Cooperion Agency (JICA) and the Directorate General of Higher Education (DGHE) on the PUSREHUT (Center for Rehabilitation of Tropical Rain Forest, at the University of Mulawarman, Samarinda, East Kalimantan) development, a joint Committee Meeting should be called to order annually to review the progress and constraints of the program, and to formulate the annual work plan of the up coming year.

The first Joint Committee meeting was held in Jakarta in October 1985, the second in November 1987 and the third in November 1988. It was in the third Joint Committee Meeting that discussions led to the recommendation to explore possibilities of extending this JICA-DGHE/PUSREHUT technical cooperation for the Second Phase (1990-1994). This recommendation is based on the fact, that the JICA-DGHE/PUSREHUT project will be terminated on December 31, 1989 and both parties agree that this technical cooperation has improved research capabilities, provided valuable field experiences, and has strengthened institutional and personal linkages among researchers of both institutions.

A working group has been appointed in response to the above mentioned recommendation, and a time schedule has been set. In preparing this proposal for project extension, justitification should be extended and how this should be organized to achieve program objectives. Therefore, project evaluation should be carrried out, meaning that a review of this technical cooperation is imperative.

Two important considerations should be kept in mind. Firstly, that the evaluation should consider the severe DGHE budget cuts starting in FY 1985/1986, which has unfavorably influenced research planning and activities for the first two years of the project implementation period. Secondly, that the mighty dipterocarp forest of East Kalimantan is already there and should be further investigated and maintained, regardless of the extension or termination of this project.

In line with DGHE policy for the fifth Five-Year Development Plan (PELITA-V) to improve educational quality and efficiency, the possibility to extend this JICA-DGHE/PUSREHUT technical cooperation should be seriously considered as the host institution, the University of Mulawarman is expected to develop into a Centter of Excellence for tropical rain forest management in the region.

Jakarta, May, 1989

I. BACKGROUND

1. Brief Review of the Technical Cooperation

The Technical Cooperation between the Government of the Republic of Indonesia and the Government of Japan, represented by the Directorate General of Higher Education (DGHE), Ministry of Education and Culture and the Japan International Cooperation Agency (JICA) at the Tropical Rain Forest Research Center (PUSREHUT) had been signed on January 1, 1985 and have been implemented almost four and a half years and will be terminated on December 31, 1989. This brief review will be developed into detail and complete review at the end of the project (December 31, 1989).

It will be very praised if review of the project can be done before the date termination, in the hope that project extension for second Phase (1990-1994) could be considered.

2. Conservation and Rehabilitation of Tropical Rain Forest

Deforestation of tropical rain forest in the world has been a global world issue as one of the serious world environmental problems.

The large area of tropical rain forest in the world is only in Brazil and Indonesia. In the last 10-20 years, deforestation in those two countries have been increasing seriously. At present (1988), the tropical rian forest in Indonesia is about 110 millions ha.

The Government of Republic of Indonesia has been carrying out forest conservation and rehabilitation program intensively, but the problems are:

a. limited inforamtion on knowledge of tropical rain forest is available, especially on valuable species of Dipterocarpaceae beside the existing genetic resource in the natural forest.

b. limited Indonesian scientists or experts in tropical rain forest.

Technical cooperation in reserarch and training between the Republic of Indonesia and the Government of Japan, represented by DGHE and JICA is a very promising cooperation in supporting serious program of Government of the Republic of Indonesia in conservation and rehabilitation of tropical rain forest, it also means suppporting the world environment quality.

The support of the Government of Japan in research and post graduate training should be managed well to reach the goal of the cooperation. Reviewing all the activities and results is a very important step to be able to user the results and improve the future activities.

3. A Short History of PUSREHUT

A cooperation between Japan International Cooperation Agency (JICA) and the University of Mulawarman, was started in the year 1978 where a building for research activities in tropical reforestation was established on November 1980. The building was formally opened under a name of Pusat Reboisasi dan Rehabilitasi Hutan Tropika or PUSREHUT.

From December 3 to 12, 1984 a Japanese Implementation Survey Team was organized by JICA headed by Dr. Kyoozi Doi to visit Indonesia. The purpose of the team is to work out details of a technical cooperation program on the tropical rain forest research. A record of discussion has been sigened by Dr. Doi and the Director General of Higher Education (DGHE) in Jakarta, on December 10, 1984. The content of the record includes among others are on experts, equipment, personal, administration, term of cooperation, master plan, land, buildings, facilities, joint committee and organization.

A supplementary note of a record of discussion of the technical cooperation was signed by Dr. Akiomi Yamane and DGHE in Jakarta, on March 19, 1985 on the construction of training center facilities at PUSREHUT. The building was formally opened on May 7, 1988.

II. REVIEW OF THE PROJECTS

1. Goal

1.1. Research

The Technical Cooperation is focused on the Tropical Rain Forest Research activities in East Kalimantan in order to contribute in advancing science and technology to develop management system for tropical rain forest in Indonesia in general and East Kalimantan in particular.

To meet the research objectives 5 (five) major research areas had been selected.

The implementation of the research plan are as follows:

a. Forest Land Use Classification and Planning

During 4.5 years, implementation of remote sensing and aerial photograph in forest land use classification gave an excellent result on its physics and technical aspect, but the implementation in forest land use has not been shown.

b. Natural Forest Management

Two subjects (ecology and management) have been covered with 6 topics. Mainly, an ecological study has been carried out in the field of forest vegetation, phenology, tree ecophysiology, forest climatology and forest animals.

Good results have been produced, but a valuable information is still far on the rehabilitation of natural forest which is relevant to the Indonesian government program.

c. Man-made Forest Management

The technical studies has been done on seed production, tissue culture as a vegetative propagation, growth of planted seedling (an effect of fertilizer and light), and some ones has been applied to a line-planting method. In the last 4 years, the researches have been concentrated on dipterocarp tree species due to its ecological dominance and industrial importance.

These researches produced fruitful results, but it is still shortage of detail knowledge in integrating each silvicultural techniques into a whole system.

d. Forest Site Classification

General soil survey including physical and chemical analysis and soil-water behaviour research have been done, with adding the comparative study among the regional diffferences. The valuable and detail basic data has being collected for three years.

e. Agroforestry

A socio-economical study has been done on the dynamics of swidden agriculture, considered as an outstanding form of agroforestry in East Kalimantan, through 24 case studies.

This research is excellent and important aspect, but it is also needed to study on the system in relation to interaction among socio-economical and ecological aspect in agroforestry.

f. Result of Research Activities

Based on the objectives of the Indonesian side in planning, implementing and monitoring, the project activities in the research areas were covered in five research area. These objectives are too general, so that the topics of each research area should be specified.

To conduct forestry research at PUSREHUT, the project invited staff from three universities (UNMUL, UGM, IPB). More senior staff are involved than junior staff in this research. It is hoped that in the future, the number of junior staff will increase. The results of research activities in the periods of FY 1986/1987 until FY 1988/1989 are presented below:

Number of on going research in the periods of FY 1986/1987 until FY 1988/1989.

Term	Subject of Research Area						
	G	R1	R2	R3	R4	R5	Total
1986/1987	2	3	-	3	2	-	10
1987/1988	-	2	3	3	2	2	15
1988/1989	-	1	5	5	1	2	14
Total	2	6	8	11	5	4	39

G= General, R1= Resaearch Area I, R2= Research Area II, R3= Research Area III, R4= Research Area IV, R5= Research Area V

In FY 1986/1987 there were two topics in general area, three topics in area I, three topics in area II, three topics in area III and two topics in area IV, totally ten research topics.

Fifteen research activities in FY 1987/1988 were carried out in the project to cover area I (two topics), II (four topics), III (four topics), IV (three topics) and V (two topics). In FY 1988/1989, there were fourteen topics which covered area I (one topic), II (five topics), III (five topics), IV (one topic) and V (two topics).

From 1986 to 1988 twenty three report were completed and published.

g. Conclusion on Research Program

(1) Results of the research program in the last 4.5 years has not been able to fulfill the needed knowledge and tools for developing Tropical Rain Forest Management.

(2) Scheme of the research network or a research flow, which shows research specification, systematic priority and schedule of particular research topics should be developed in achieving the research goal (Tropical Rain Forest Management).

(3) The Technical Cooperation between the Government of the Republic of Indonesia and the Government of Japan in joint research program should be extended in the second phase (1990-1994).

(4) Dispatch of Japanese Experts is an excellent systems and should be continued. Joint research of Indonesian scientists with Japanese Experts and regular discussion or seminar could maximize the transfer and exchange ideas and knowledge.

1.2. Counterpart Training

Training of Indonesian Personnel in Japan has been implemented since 1985/1986 in the form of short visit for one to 6 months (9 persons) and one person (Ecep Iskandar) has two years training in the third country (Malaysia). In 1989, it is planned to send 3-4 Indonesian personnels to Japan.

Short training for Indonesian scientists in Japan is very important and beneficial program in increasing knowledge and capability of Indonesian scientists in conducting research in Indonesia.

Remarks and Conclusion

1) Training of Indonesian scientists in Japan is a very beneficial in strengthening research and training capability in Indonesia.

(2) Training in Japan for thirteen or fourteen Indonesian scientists in five years in suitable. If this program can be continued, the number of Indonesian scientists trained in Japan should be kept as same as the number in the first phase. However, the training could be conducted not only in japan but also in third country.

(3) Subject of training should be related to the existing research program.

1.3. Research Station Facilities

Construction of the nurseries facilities on a half ha land including water supply for Bukit Soeharto Research Center and PUSREHUT and the forest road at Bukit Soeharto Experimental Forest to support project activities, especially in research. Construction of the research station facilities has increasing capability of UNMUL in general and PUSREHUT in particular.

Remarks and Conslusion

To conduct various kinds of research subject on Tropical Rain Forest some other facilities are still needed, such as: watershed facilities, fire protection control facilities, etc.

1.4. Training Center Facilities

Two-hectar lands at the campus have been constructed for Training Center. Accommodation facilities for training participants and laboratory equipments are vital facilities for a Research Center. PUSREHUT should be developed to be the best Tropical Rain Forest in Indonesia and in Asia.

Conclusion

Development of PUSREHUT to a Research Center for Tropical Rain should be continued.

2. Method

2.1. Hardware

The kinds of laboratory equipments are sufficient for supporting the five areas of rresearch, however the number and spare parts should be adequate as well.

2.2. Sofware

The function and composition of the Research Committee should be increased. The most important problem is the coordination of

research activities, such as: relevance of the topics, methodology, report writing, etc.

There is a lack of comprehensive research framework (system) plan to reach the goal (Management of Tropical Rain Forest).

This project have been developed under Inter University Center system successfully. This unique and excellent system should be kept in the next extended phase. At the same time, UNMUL should also have a certain level of authority and responsibility with in the frame work of the project.

2.3. Manpower

Joint research between young scientists, young Doctors and Seniors or experts from Japan and Indonesia should be increased especially in increasing a Training Research Program of this project.

The new comer of young Doctors besided (together with) senior scientist will strengthen reseach workers, but it is still a constraint previously in recruiting senior scientists from IPB and UGM.

2.4. Funding

DGHE have tried and succeeded to ensure enough research budgets during these three fiscal years. DGHE will continue to allocate budget for the project.

III. PROPOSAL FOR THE SECOND PHASE (1990-1994) OF THE COOPERATION PROGRAM

1. Background

The objectives of the DGHE-JICA cooperation for the Tropical Rain Forest Research Project in 1985/1989, now are getting more and more important role in the issue of tropical rain forest management in Indonesia.

New information has been colleccted from researches during four and half years cooperation. The objectives of the project in developing information to contribute to a sound management of tropical rain forest through a joint research program between Indonesian scientists (especially UNMUL staff) and Japanese scientists (JICA) have been accomplished at this stage. The other objectives of the project to increase capability of PUSREHUT in conducting training and research through Indonesian personnel training, research training, and by developing research station facilities and Training Center facilities have been reached the goal of the project.

Even though success of the five years cooperation has been reached, after studying the review of all activities and results it should be explored possibility to extend the cooperation for the next five years (1990-1994) or the second phase of the DGHE-JICA cooperation.

This proposal for the second phase has been developed to be used as a material input in facing the termination of the first phase of cooperation on December 31, 1989.

2. Goal

2.1. Dispatch of Japanese Experts

Dispatch of the long and short term Japanese experts had given outstanding results in:

a. Contribution important information from their researches to develop a sound management of tropical rain forest.

b. Training to the young Indonesian scientists in joint researches.

c. Developing academic activities in seminar or discussion for exchange of information and experiences.

PUSREHUT still need assistance from Japanese experts to increase capability in conducting training and research.

Number of short and long term Japanese experts should be flexible depends on the budget available. The number in phase one (1985-1989) should still be kept for the phae two.

2.2. Reseach

The area of studies should related to the maintaining sustained growth and utilization of resources efficiently.

In order to do so, a joint team between senior forestry scientists from Japan and Indonesia should be exstablished to develop a more comprehensive research program with more specified for more detail. Senior scientists from IPB and UGM participating in the research activities can be involved as the supervisors for young scientists from UNMUL, UGM or IPB.

The research will include the following areas:

1. Forest land Use Classification and Planning

Study on forest land use classification still need to be conducted to draw a land classification map using remote sensing system. Remote sensing analysis is a very important measure to provide various kinds of information such as colorful and visible map to the other research areas.

2. Naturl Forest Management

Based on the former researches, basic study of forest dynamics or forest regeneration should be conducted, which include seed production (include phenology), seedling stablishment and growth, tree growth and behavior.

As the other practical matters, an ecological changes caused by logging and a secondary succession of burned forest should be considered.

3. Man-made Forest Management

Continuous research on silviculture of dipterocarp species is still important with adding the otehr species, and should be done more detail on the following items;

(a) to establish of some propagation methods such as seed technology, tissue culture, cutting and layering,

(b) to advance a tending method especially based on the sunlight control.,

(c) to continue an investigation of fertilizer effected,and

(d) to develop practical seedling culture by utilizing mycrophyzal technique.

d. Forest Site Classification (or Forest Soil

(a) The former basic studies should be continued such as the physical and chemical analysis of soils based on difefrent parent materials, and soil-water behavior.

The following current topics also should be considered for the future program:

(b) Decrease and recovery of soil fertility under the swidden cultivation system,

(c) Soil erosion and conservation under the swidden cultivation in suburban districts, and

(d) Nutrient behavior and existence form of organic materials in above ground, ground surface and root sphere in tropical rain forest.

e. Forest Economy

Based on the result of the former research, the following topics are necessary to be conducted as advancing the study of agroforestry:

(a) Study on swidden agriculture from the view point of vegetation and soil condition, and

(b) ecological and socio-economical study on agroforestry in order to improve the destructive systems which are mainly seen in the vicinity of Samarinda.

This area should be changed from Agroforestry to Forest economy in the future so that it is available to deal with the current topics such as socio-economical aspects of logging and various kinds of community.

The implementation of the research will be as follows:

a. Joint research

For the accomplishment of the second phae of the project, the integrated research or joint research among 5 areas should be taken for the following real issues as a problem-solving type research in East Kalimantan:

- growth and yield studies resulting management inputs in natural forest,

- studies on logged over areas, its ecological change and rehabilitation method (TPI),

- studies on change of soil and vegetation at swidden agriculture

- studies on environmental degradation,
- buffer-zone management planning, and
- agrogorestry.

b. Seminar and publication

A small seminar should be regularly held at PUSREHUT in two or three months on the topics conducted by Indonesian and Japanese scientists in this project. It is expected to promote each research and exchange useful informations to be worthy of research institute. Publication of research articles and seminar proceedings should be conducted.

c. Research Management

Procedure and format to reserarch proposal, selection, monitoring and evaluatuion should be established.

2.3. Counterpart Training

Training for Indonesian personnel in Japan or in the third countries can be conducted in relation with the research topics in the project and the use of equipment in the project.

2.4. Research Station Facilities

Improving the existing facilities and adding some other facilities are needed in correlation to the ressearch program in the next five years and also in the short future.

2.5. Training Center Facilities

In completion, the training center facilities related to the training activities will be conducted in the short future for Indonesian young scientists or Indonesian manpower as a graduate education and a non degree training.

3. Method

3.1. Hardware

Research and training facilities of PUSREHUT at the end of 1989 still good enough to support the next research period and to start conducting a traininig but, improving the facilities and supply of spare parts are needed.

3.2. Sofware

The existing organization and the function is good enough to implement the cooperation, improvement can be done such as:

a. Increasing the function and potential of the Research Committee, for instance in directing and coordinating research activities, and also supervising in research methodology and report writing for young scientists.

b. Regular meetings such as technical meeting or implementation policy meeting, should be held at PUSREHUT to promote research activities and better communication.

c. Vice project manager should be appointed at DGHE to assist a smooth management of project.

d. Steering the seminar and editing the publication.

3.3. Manpower

We should make efforts to find young researchers who are intent upon doing studies on tropical rain forest.

3.4. Funding

Because of limited budget from the DGHE, the budget from JICA should also available for management activities.

4. Recommendations

4.1. Considering the potential project resource and development momentum, in a broad sense the project should be extended for the next phase (1990-1994).

4.2. The organization of the project in the second phase is proposed to be similar as in the first phase (1984-1989).

8 討議議事録（R／D）

THE RECORD OF DISCUSSIONS
BETWEEN
THE JAPAN INTERNATIONAL COOPEPATION AGENCY
AND
THE AUTHORITIES CONCERNED OF THE GOVERNMENT OF THE REPUBLIC OF INDONESIA
ON
THE TECHNICAL COOPERATION
FOR
THE TROPICAL RAIN FOREST RESEARCH PROJECT PHASE II

The Japan International Cooperation Agency (hereinafter referred to as "JICA") had a series of discussions, through the Resident Representative of JICA in the Republic of Indonesia, with the authorities concerned of the Government of the Republic of Indonesia on desirable measures to be taken by both Governments for the technical cooperation programme concerning the Tropical Rain Forest Research Project Phase II, reflecting the recommendation of the Report of the Joint Evaluation on the Tropical Rain Forest Research Project dated July 18th, 1989.

As a result of discussions, JICA and the authorities concerned of the Government of the Republic of Indonesia agreed to recommend to their respective Governments the matters referred to in the document attached hereto.

Jakarta, December 22, 1989

Mr. Yasuo KITANO
Resident Representative
Japan International Cooperation
Agency
in the Republic of Indonesia

Prof. Dr. Sukadji Ranuwihardjo
Director General
of Higher Education
Ministry of Education
and Culture

THE ATTACHED DOCUMENT

I. COOPERATION BETWEEN BOTH GOVERNMENTS

1. The Government of Japan and the Government of the Republic of Indonesia will cooperate with each other in implementing the Tropical Rain Forest Research Project Phase II, JTA-9(a)-137 (hereinafter referred to as "the Project") at the PUSREHUT (Center of Study for the Tropical Rain Forest Reforestation and Rehabilitation), Samarinda, East Kalimantan, for the purpose of conducting research activities on tropical rain forest, and thus contribute to the sound management of tropical rain forest in Indonesia.

2. The Project will be implemented in accordance with the Master Plan given in Annex I.

3. The Project will be carried out mainly at PUSREHUT which has been established with the Japanese grant aid scheme agreed between the two Governments by Exchange of Note dated 1, November 1979.

II. DISPATCH OF JAPANESE EXPERTS

1. In accordance with laws and regulations in force in Japan, the Government of Japan will take necessary measures through JICA to provide at its own expense the services of Japanese experts as listed in Annex II through normal procedures under the Colombo Plan Technical Cooperation Scheme.

2. The Japanese experts referred to in 1 above and their families will be granted in the Republic of Indonesia privileges, exemptions and benefits no less favorable than those accorded to experts of third countries working in the Republic of Indonesia under the Colombo Plan Technical Cooperation Scheme, and will include the following: