Successional Agroforestry Systems for Sustainable Cocoa Production within the Conservation Districts of Malinau and Kapuas Hulu

Sistem Successional Agroforestry untuk Produksi Kakao Berkelanjutan di Kabupaten Konservasi Malinau dan Kapuas Hulu
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Sistem *Successional Agroforestry* untuk Produksi Kakao Berkelanjutan di Kabupaten Konservasi Malinau dan Kapuas Hulu

Dr. Joachim Milz
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# TABLE OF CONTENTS

**DAFTAR ISI**

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>List of Figures</td>
<td>v</td>
</tr>
<tr>
<td>Daftar Gambar</td>
<td>v</td>
</tr>
<tr>
<td>Abbreviations</td>
<td>vi</td>
</tr>
<tr>
<td>Daftar Singkatan</td>
<td>vi</td>
</tr>
<tr>
<td>Introduction</td>
<td>1</td>
</tr>
<tr>
<td>Pendahuluan</td>
<td>1</td>
</tr>
<tr>
<td>Main Findings</td>
<td>5</td>
</tr>
<tr>
<td>Temuan Utama</td>
<td>5</td>
</tr>
<tr>
<td>Background</td>
<td>6</td>
</tr>
<tr>
<td>Latar Belakang</td>
<td>6</td>
</tr>
<tr>
<td>Overview of Cocoa Production in Malaysia and Indonesia</td>
<td>6</td>
</tr>
<tr>
<td>Gambaran Umum mengenai Produksi Kakao di Malaysia dan Indonesia</td>
<td>6</td>
</tr>
<tr>
<td>Agro-ecological Requirements of the Cocoa Tree</td>
<td>11</td>
</tr>
<tr>
<td>Persyaratan Agro-ekologi Tanaman Kakao</td>
<td>11</td>
</tr>
<tr>
<td>Principles of Dynamic Agroforestry Systems</td>
<td>11</td>
</tr>
<tr>
<td>Prinsip Dasar Sistem Agroforestri Dinamik</td>
<td>11</td>
</tr>
<tr>
<td>Situation of the Cocoa Production at the Malinau and Kapuas Hulu District</td>
<td>13</td>
</tr>
<tr>
<td>Produksi Kakao di Kabupaten Malinau dan Kapuas Hulu</td>
<td>13</td>
</tr>
<tr>
<td>Malinau District</td>
<td>13</td>
</tr>
<tr>
<td>Kabupaten Malinau</td>
<td>13</td>
</tr>
<tr>
<td>Kapuas Hulu District</td>
<td>19</td>
</tr>
<tr>
<td>Kabupaten Kapuas Hulu</td>
<td>19</td>
</tr>
<tr>
<td>Recommendations</td>
<td>20</td>
</tr>
<tr>
<td>Rekomendasi</td>
<td>20</td>
</tr>
<tr>
<td>Literature References</td>
<td>23</td>
</tr>
<tr>
<td>Daftar Pustaka</td>
<td>23</td>
</tr>
<tr>
<td>Annex 1. Terms of Reference (TOR)</td>
<td>25</td>
</tr>
<tr>
<td>Lampiran 1. Terms of Reference (TOR)</td>
<td>25</td>
</tr>
<tr>
<td>Annex 2. Activities</td>
<td>27</td>
</tr>
<tr>
<td>Lampiran 2. Activities</td>
<td>27</td>
</tr>
<tr>
<td>Annex 3. Growth of the demonstration plots in pictures</td>
<td>31</td>
</tr>
<tr>
<td>Lampiran 3. Pertumbuhan tanaman di dalam plot demonstrasi dalam gambar</td>
<td>31</td>
</tr>
</tbody>
</table>
Table of Figures

Daftar Gambar

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 1.</td>
<td>FORCLIME pilot districts in the Heart of Borneo (HoB)</td>
<td>2</td>
</tr>
<tr>
<td>Gambar 1.</td>
<td>Kabupaten percontohan FORCLIME di Heart of Borneo</td>
<td>2</td>
</tr>
<tr>
<td>Figure 2.</td>
<td>Development of cocoa production of Brazil, Malaysia and Indonesia from 1961 to 2009 (FAOSTAT 2011)</td>
<td>7</td>
</tr>
<tr>
<td>Gambar 2.</td>
<td>Perkembangan Produksi Kakao di Brazil, Malaysia dan Indonesia dari tahun 1961 s/d 2009 (FAOSTAT 2011)</td>
<td>7</td>
</tr>
<tr>
<td>Figure 3.</td>
<td>Cocoa distribution in District of Malinau</td>
<td>14</td>
</tr>
<tr>
<td>Gambar 3.</td>
<td>Distribusi Kakao di Kabupaten Malinau</td>
<td>14</td>
</tr>
<tr>
<td>Figure 4.</td>
<td>Young plantations between 2 and 7 years old without any shade trees</td>
<td>15</td>
</tr>
<tr>
<td>Gambar 4.</td>
<td>Perkebunan kakao, antara 2-7 tahun, tanpa tanaman/pohon peneduh</td>
<td>15</td>
</tr>
<tr>
<td>Figure 5.</td>
<td>Overall deplorable phytosanitary aspect, presence of symptoms of “dieback” due to lack of shade and probably VSD (Vascular Streak Dieback)</td>
<td>15</td>
</tr>
<tr>
<td>Gambar 5.</td>
<td>Aspek fitosanitasi secara kesuluruhan sangat memprihatinkan, adanya gejala “dieback” karena kurangnya tanaman peneduh dan kemungkinan penyakit VSD (Vascular Streak Dieback)</td>
<td>15</td>
</tr>
<tr>
<td>Figure 6.</td>
<td>Presence of cocoa stem borer</td>
<td>16</td>
</tr>
<tr>
<td>Gambar 6.</td>
<td>Adanya ulat penggerek batang kakao (cocoa stem borer)</td>
<td>16</td>
</tr>
<tr>
<td>Figure 7.</td>
<td>Extremely high pressure of weeds</td>
<td>16</td>
</tr>
<tr>
<td>Gambar 7.</td>
<td>Banyaknya gulma</td>
<td>16</td>
</tr>
<tr>
<td>Figure 8.</td>
<td>Frequent use of Herbicides, Pesticides and Mineral Fertilizer (donation from the local district government)</td>
<td>17</td>
</tr>
<tr>
<td>Gambar 8.</td>
<td>Seringnya penggunaan herbisida, pestisida, dan pupuk kimia (sumbangan dari PEMDA)</td>
<td>17</td>
</tr>
<tr>
<td>Figure 9.</td>
<td>Few plantations are over shaded or not stratified</td>
<td>17</td>
</tr>
<tr>
<td>Gambar 9.</td>
<td>Beberapa perkebunan memiliki tanaman peneduh yang berlebih atau tidak terstruktur</td>
<td>17</td>
</tr>
<tr>
<td>Figure 10.</td>
<td>Cocoa Distribution in the District of Kapuas Hulu</td>
<td>20</td>
</tr>
<tr>
<td>Gambar 10.</td>
<td>Distribusi Kakao di Kabupaten Kapuas Hulu</td>
<td>20</td>
</tr>
</tbody>
</table>
### ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPB</td>
<td>Cocoa Pod Borer (penggerek buah kakao)</td>
</tr>
<tr>
<td>FAOSTAT</td>
<td>Food and Agriculture Organization Statistics</td>
</tr>
<tr>
<td>FOB</td>
<td>Free on Board</td>
</tr>
<tr>
<td>FORCLIME</td>
<td>Forests and Climate Change Programme</td>
</tr>
<tr>
<td>HoB</td>
<td>Heart of Borneo (Jantung Borneo)</td>
</tr>
<tr>
<td>GIS</td>
<td>Geographic Information System (Sistem Informasi Geografis)</td>
</tr>
<tr>
<td>GIZ</td>
<td>Deutsche Gesellschaft für Internationale Zusammenarbeit</td>
</tr>
<tr>
<td>GIZ DS</td>
<td>GIZ Development Service</td>
</tr>
<tr>
<td>ICCO</td>
<td>International Cocoa Organization (Organisasi Kakao Internasional)</td>
</tr>
<tr>
<td>KfW</td>
<td>KfW Entwicklungsbank</td>
</tr>
<tr>
<td>KSN</td>
<td>National Strategic Areas (Kawasan Strategis Nasional)</td>
</tr>
<tr>
<td>HHBK</td>
<td>Hasil Hutan Bukan Kayu</td>
</tr>
<tr>
<td>NTFP</td>
<td>Non-Timber Forest Product</td>
</tr>
<tr>
<td>REDD</td>
<td>Reducing Emissions from Deforestation and Forest Degradation (Reduksi Emisi dari Deforestasi dan Degradasi Hutan)</td>
</tr>
<tr>
<td>VSD</td>
<td>Vascular Streak Dieback</td>
</tr>
</tbody>
</table>
Introduction

The Forests and Climate Change Programme (FORCLIME) is a bilateral programme between the governments of Indonesia and Germany which include three components (Component 1, 2 and 3). The objectives of each component are:

1. The institutional and regulatory framework set out by central and district governments for implementing sustainable forest management and reducing greenhouse gases from deforestation and forest degradation has improved

2. The actors in the pilot districts apply the improved framework for implementing forest administration reform in sustainable forest management and REDD activities

3. Schemes for effective nature conservation, natural resource management and the improvement of the basic conditions of life for poor communities dependent on forests in selected districts in the Heart of Borneo are implemented by relevant stakeholders

Since 2009, FORCLIME is supporting the Indonesian Government as well as relevant public and private actors in developing and implementing the institutional and regulatory framework, methods and services for sustainable forest management, nature conservation and the reduction of greenhouse gas emissions from deforestation and forest degradation in the first phase of the programme. The second phase of the programme is envisaged from 2013 until 2016 with an option for a third phase until 2020. FORCLIME is concentrating its support in the districts of Kapuas Hulu (West Kalimantan), Malinau (East Kalimantan), and Berau (East Kalimantan) in the framework of the programme. Kapuas Hulu and Malinau districts belong to the Heart of Borneo (HoB) and all three districts are included in the National Strategic Areas (KSN).

Pendahuluan

Forests and Climate Change Programme (FORCLIME) adalah program bilateral antara pemerintah Indonesia dan pemerintah Jerman yang memiliki tiga komponen (Komponen 1, 2, dan 3). Tujuan yang ingin dicapai dari masing-masing komponen adalah:

1. Peningkatan kerangka kelembagaan dan peraturan yang ditetapkan oleh pemerintah pusat dan daerah untuk pelaksanaan pengelolaan hutan lestari dan pengurangan gas rumah kaca dari deforestasi dan degradasi hutan.

2. Berhasilnya pelaksanaan proses reformasi administrasi kehutanan yang diarahkan pada pengelolaan hutan lestari dan kegiatan REDD oleh para aktor di kabupaten percontohan.

3. Pelaksanaan skema oleh para pemangku kepentingan (stakeholder) terkait untuk pelestarian/konservasi alam yang efektif, pengelolaan sumber daya alam, dan perbaikan kondisi pokok kehidupan masyarakat miskin yang bergantung kepada hutan di kabupaten terpilih dalam kawasan Heart of Borneo (HoB).

Pilot Districts of FORCLIME Programme in the "Heart of Borneo Region"

Legend
- Cities (Major/ Capital)
- Boundary
  - National
  - Provincial
  - Pilot District
  - "Heart of Borneo Region"

Figure 1. FORCLIME pilot districts in the Heart of Borneo (HoB)

Gambar 1. Kabupaten percontohan FORCLIME di Heart of Borneo
One objective of the programme, stated in indicator 4 of Component 3, is to improve the livelihood conditions especially for families living in and around the protected areas and national parks. To achieve this objective, cocoa has been identified as a potentially suitable NTFP (non-timber forest product) since the early days of the programme when the consultancy has been carried out within Component 3. Indonesia is one of the largest cocoa producers in the world with cocoa seeds production reached 849,875 tons per year in 2009. The growth of Indonesia’s cocoa production over the past three decades has been remarkably high with an annual average increase of over 20%. The majority of this increase came from smallholders, whom accounted for approximately 82% of production in the year 2000, compared to just 10% in 1980.

However, the increase in production is often simultaneous with the conversion of forests into agricultural areas, putting even more pressure on forests. Cocoa in Indonesia is also grown with high input of mineral fertilizers and pesticides. Recently, the Indonesian Government has formulated an objective to become the world largest cocoa producer in the coming years and is now generating different programmes and projects with the objective to increase the production and quality of cocoa. If conventional methods of increasing production (which are increasing areas of plantations and having high input of mineral fertilizers and pesticides) will be applied, the costs to the environment will be remarkably high.

The idea of FORCLIME is therefore to increase rural income as well as environmental conservation and rehabilitation through the dissemination of successional agroforestry systems and the certification of sustainable cocoa production in the three districts of Kapuas Hulu, Malinau, and Berau. Though cocoa agro-forests cannot match the biodiversity level of primary forests, however, the overall level of biodiversity in cocoa agro-forests is shown to
be higher than in other agricultural landscapes. Producing cocoa sustainably, which takes into account environmental aspects, biodiversity, and conservation, is especially important since the three districts have been declared as conservation districts.

Alongside with this idea of sustainable cocoa production, all cocoa producing companies in Indonesia also have the objective to achieve a fully sustainable cocoa production by 2020. Moreover, the current world market also shows an increasing demand for cocoa in the coming years. Considering these conditions, the programme idea matches well with the interest of the cocoa industry. This shared interest, combined with the market condition and the potentials to sustainably produce better quality cocoa, thus bares a high potential for a successful synergy between the programme and the cocoa industry.

Currently, FORCLIME is preparing cocoa baseline studies and rapid market assessments in both Malinau and Kapuas Hulu districts. The goals of the studies and assessments are to analyze the potential of cocoa production in the region and to develop strategies for sustainable cocoa production based on natural succession (agroforestry). An international short-term consultancy had also been arranged on behalf of ECO-Consult Sepp & Busacker partnership (see Annex 1 for Terms of Reference) from October 8 to October 18, 2011. During the preparation for the international short term consultancy, plenty of information was obtained, especially regarding current and future demand for cocoa. The preparation of meetings with local authorities and the field visit by GIZ DS experts in GIS and Community Forestry Development were also outstanding.

During the field study, nine different cocoa plantations in the surroundings of Malinau have been visited. The international consultant Dr. Joachim Milz has been accompanied by the Team Leader of Component 3, Mr. Heinz Terhorst, the GIZ DS expert, Timo Beiermann, and the
local responsible for cocoa cultivation, Pak Yance from the district Department of Plantations. Additionally, a workshop with extension workers of the local government and a meeting with the Heads of five sub-districts have been organized. Approximately 150 people (producers, local advisers, officials, and a group of farmers from Kapuas Hulu district) participated in the events.

Main Findings

The cocoa cultivation in the region has a very good potential, climate and soils are well suited for cocoa cultivation. The producers showed a lot of interest in the proposed improvements.

The cocoa crop is suited to achieve one of the main objectives of the programme (component 3) – promotion of nature conservation and sustainable development and livelihood improvement in bio diverse areas in the Heart of Borneo (HoB), in terms of:

- Buffer Zone Management,
- Improvement of income through sustainable cocoa farming,
- Diversification of income opportunities by integrating complementary crops in the production systems (banana, pepper, vanilla, native fruits, ginger, curcuma, rubber, high value timber),
- Food security (in the context of diversification and especially during the first years of new plantings),
- Setting up protected areas for water catchment areas and hydro energy,
- Protection of biodiversity and regeneration of degraded soils,
- Cocoa systems can contribute directly and indirectly to a net carbon sink,
Resilience to climate change,

Close interactions between trees in agricultural systems can enhance other types of biodiversity by favoring colonization by fauna.

The market prospects are assessed as favorable; the cocoa industry expects in the coming years an annual increase in demand of 2% with persistently high world market prices.

The current situation of the plantations must be considered as extremely critical. Already young plantations are extremely weak and damaged by soil degradation, pests and diseases, caused by poor management and un-shaded monoculture cultivation.

The program has good contacts with local authorities, technicians and communities, which is a prerequisite for developing a strategic plan to meet the program objectives.

Especially older farmers still have good knowledge of local crops and tree species. This population group understands very quickly the proposed approach, since they ultimately meet their traditional form of cultivation.

It is envisaged that the burning of cleared fields should be banned by a district regulation.

Background

Overview of Cocoa Production in Malaysia and Indonesia

Originally, cocoa is from the Amazon Rainforest, which is generally located in the lower stratus of the rainforest, covered by fruit and timber trees. According to FAOSTAT (accessed March 2010), the world cocoa production area increased from 4.4 million ha to 8.3 million ha between 1970 and 2007. In this timeframe, the five main

Situasi perkebunan kakao di Kabupaten Malinau dan Kapuas Hulu saat ini sangatlah kritis. Kondisi tanaman-tanaman kakao yang masih muda sudah sangat lemah dan sudah rusak karena degradasi tanah, hama dan penyakit, yang diakibatkan oleh pengelolaan yang buruk dan penanaman monokultur tanpa tanaman peneduh.

FORCLIME memiliki hubungan yang baik dengan otoritas lokal, teknisi dan masyarakat setempat, yang merupakan prasyarat dalam mengembangkan rencana strategis untuk mencapai tujuan program.

Petani di daerah setempat, terutama yang usianya lebih tua, masih memiliki pengetahuan mengenai tanaman-tanaman dan spesies-spesies pohon lokal. Mereka cepat mengerti sistem yang diajukan, karena sistem tersebut memang serupa dengan metode penanaman tradisional mereka.

Teknik pembakaran untuk membersihkan lahan harus dilarang melalui peraturan daerah kabupaten.

Latar Belakang

Gambaran Umum mengenai Produksi Kakao di Malaysia dan Indonesia

providing countries in terms of cocoa surfaces changed from Ghana, Nigeria, Brazil, Ivory Coast and Cameroon (in decreasing order) to Ivory Coast, Ghana, Nigeria, Indonesia and Brazil.

Malaysia was on the way to join the group of five, with a spectacular increase on planted areas from 4,000 ha in 1970 up to 297,600 ha in 1990, followed by a sharp decrease to 30,800 ha in 2007. There is no other country with such dynamics in cocoa plantation area.

Indonesia is one of the biggest cocoa producer in the world with cocoa seeds production reached 849,875 ton per year in 2009, even if it has not been recognized widely yet. The growth of Indonesia’s cocoa production over the past three decades has been remarkable, rising from just 4,000 tons in 1975/76 to around 800,000 tons in 2009/10 - an annual average increase of over 20% and is currently the fourth largest cocoa producer. The majority of this increase came from smallholders.

Gambar 2.
Perkembangan Produksi Kakao di Brazil, Malaysia dan Indonesia dari tahun 1961 s/d 2009 (FAOSTAT 2011).

Figure 2.
Development of cocoa production of Brazil, Malaysia and Indonesia from 1961 to 2009 (FAOSTAT 2011).
producing at very low costs. Smallholders accounted for approximately 82% of production in the year 2000, compared to just 10% in 1980. In addition, the country’s infrastructure, combined with minimal government intervention, has created a highly efficient marketing system that results in growers receiving more than 75% of the export price (LMC International: The World Cocoa Market Outlook, May 2000).

Currently, Indonesia has the lowest production costs of the world’s major producers. Indonesian smallholder yields are considerably higher than their West African counterparts, reaching levels as high as 2,000 kg per hectare in areas with a low incidence of pests and diseases. A major factor is the age of the tree stock, with as much as half under ten years old, thus providing sufficient potential for the further expansion of production. On average, however, yields are much lower, at 1,000 kg per hectare. There are substantial areas of suitable land still available for new planting, together with a plentiful supply of labor (LMC International: The World Cocoa Market Outlook, May 2000).

The devaluation of the rupiah in mid-1997 provided a massive boost to local producer prices, providing further impetus to the expansion of output. Producer prices in local currency terms rose from an average of less than 2,500 Rp/kg in 1996/97 to more than 9,000 Rp/kg in 1997/98 and even reached 19,000 Rp/kg in June 1998, coinciding with the peak harvesting period. Indonesian beans are of relatively poor quality and sell at a discount on the world market. As a result, grower’s share of the ICCO price is relatively low despite receiving a high share of the FOB price (LMC International: The World Cocoa Market Outlook, May 2000).

Cocoa in Indonesia is grown with high input of mineral fertilizer and pesticides, using similar technologies as in Malaysia during the 1980s. There is a high risk that similar problems as happened in Malaysia may occur in a near future.
Therefore, it is useful to have a look to what had happened in Malaysia concerning the collapse of cocoa production in the 1990s.

In Malaysia, the large cocoa plantations were mostly owned by corporations, some with state participation. In the 1980s, they mainly cultivated rubber trees (*Hevea brasiliensis*) and oil palms (*Elaeis guineensis*), while the cocoa-growing area of these societies was rarely more than 10% of the total production area. The production structure with the direct involvement of the state implied that significant investments in research and infrastructure were supplied, and public as well as private funds were invested in profitable agriculture branches (inter alia 17/82 in form of cheap loans). Immigrants from Indonesia and the Philippines (CIRAD, 1990) mainly covered labor requirements.

During the 1980s, the cocoa cultivation without shadowing was strongly reinforced, as well as the intensive use of chemical fertilizers and pesticides, in order to further increase yields. Plant health problems such as VSD (*Vascular Streak Dieback*) caused by the pathogen *Oncobacilium theobromae* or cocoa pod borer (*Conopomorpha crammerella*)/CPB, were indeed latent existing but were not a serious threat (CIRAD, 1990; Chok, 1998). At that time, with intensive cultivation methods, crop yields of two tons dry beans/ha were normal.

Already in the early 1970s, the first tolerant clones towards VSD, the PBC 123 and PBC 149, were selected. When the cocoa disease became a serious threat, the hazard could be still challenged at the beginning by a renewal of plantations and side-grafting with the tolerant clones. However, the connected risk was the low genetic variability of the cocoa plantations associated with increased risk to diseases and pests (Chock, 1998). In fact, during an extreme dryness in the 1980s the cocoa pod borer (*Conopomorpha crammerella*) that damaged massively young pods, appeared endemically. At that time, cocoa was already the third most important export product of Malaysia. A concerted action between
the cocoa industry and the government tried under inclusion of a big international cocoa expert team to develop countering strategies. Different combat forms were tested. After an unsuccessful attempt to handle the problem through biological pest control, the so called “sleeving” was propagated, in which all achievable cocoa fruits were wrapped in a thin plastic bag, in order to protect them from pests. During 5 years, this labor-intensive method of control was practiced. The use of so-called “environmental friendly” insecticides in form of synthetic pyrethroids eventually replaced this method. In 14-days intervals, the spraying was carried out. An annual rate of 4 l insecticide per ha was applied, which represented around 22 per cent of the total production cost. The full sun cultivation also required a high level of fertilizers. The still stable and low world cocoa price in the 1990s coupled with the high production costs lead to the end of the “industrial” production of cocoa in Malaysia. The now unprofitable cocoa cultivation could be substituted, with assistance measures by the state, by the fast expansion of the oil palm and rubber cultivation (Chok, 1998). Interestingly, Malaysia has well established cocoa processing capacities, from which the Asian market is delivered. To do so, nowadays Malaysia needs to import the raw materials, the dry beans, from all over the world.

The examples Malaysia illustrate how a production system can collapse within a few years. In this case, the increasing production cost due to massive plant health problems related to low world market prices, led to a crisis of cocoa production in this country. The production system was not recognized as a problem and thus questioned. Rather, searching for new technologies to solve the phytosanitarian problems (so far without much success) and as well searching in the meantime for other economically profitable alternatives to cocoa cultivation was done.

Agro-ecological Requirements of the Cocoa Tree

The natural habitat of cocoa plants is the tropical rainforest where it predominantly occurs in alluvial forests within the sphere of influence of the rivers. Both the annual floods and the higher wind speeds above the water lead to a regular rejuvenation of these ecosystems.

With a height of up to 9 meters, the cocoa plant is a small understory tree of the primary forest. It is associated with a vast mixture of tree species providing a stratified forest structure and a constantly high input of organic matter (Götsch, E. 1994; Milz, J. 1995, 1996, 2002, 2006. Osterroth, M., 2002, Peneireiro Mongeli, F. 1999)

The cocoa tree has to be considered therefore as a “non timber forest product”. To grow cocoa in a sustainable and healthy way, it is indispensable to design agroforestry Systems which are close to the structure of local native forests, respecting a high biodiversity and stratification of the production system.

Successional Agroforestry Systems are corresponding in a perfect manner to these requirements.

Principles of Dynamic Agroforestry Systems

Vital processes are very dynamic and they are subject to a permanent flow of energy, water and nutrients. In nature, these processes happen all the time allowing for the development of dynamic and stable life systems. Due to their particular climate, topography and soil, humid tropical forests are home to diverse forms of flora and fauna that respond perfectly to the particularities of these regions. The regeneration, recovery and renovation of these systems, takes place through succession processes. Within these processes, each species occupies, for a certain period of time, a specific niche in the ecosystem.

Persyaratan Agro-ekologi Tanaman Kakao

Habitat alami tanaman kakao adalah di hutan hujan tropis dimana keberadaannya dominan di hutan aluvial yang dipengaruhi oleh sungai-sungai yang berada di sekitarnya. Banjir tahunan dan kecepatan angin yang lebih tinggi di atas permukaan sungai mengakibatkan terjadinya rejuvenasi reguler pada ekosistem tersebut.


Sistem Successional Agroforestry adalah sistem yang tepat karena memenuhi persyaratan tersebut.

Prinsip Dasar Sistem Agroforestri Dinamik

Proses-proses vital sangatlah dinamis dan merupakan subjek dari alur permanen energi, air, dan unsur hara. Di alam, proses-proses ini terjadi setiap saat, yang memungkinkan terbentuknya sistem kehidupan yang stabil dan dinamis. Karena iklim, topografi, dan tanahnya yang khusus, hutan hujan tropis menjadi rumah bagi berbagai macam jenis flora dan fauna yang bisa beradaptasi dengan kekhususan daerah tersebut. Regenerasi, pemulihan, dan renovasi dari sistem-sistem ini terjadi melalui proses suksesi. Dalam proses ini,
time, a given space in which it contributes with its particular capacity to improve and to optimize its conditions as well as those of the members of its consortium to grow prosper and to reproduce. As time passes, each species - by performing its functions- creates the necessary conditions for the development of another (more demanding) species ensuring that the energy, water and nutrient dynamics are maintained. As a result, nature creates more and more complex systems which results in more diverse forms (Götsch, E. 1994; Milz, J. 2002; Milz, J. 2006; Schulz, B. 1994; Schulz, B. et al. 1994).

“By understanding and taking advantage of the principles underlying natural succession we achieve an abundant agricultural and forest production without using chemicals or struggling against “diseases” and “pests”.

One of the most important measures for the improvement and maintenance of soil fertility in dynamic agroforestry production systems is the continuous addition of woody (ligneous) organic material, of which large amounts become available every year as a result of pruning measures (Lemieux, G. 1996; Caron, C. et al. 1996).

The lifecycle of a cocoa tree can span well over a hundred years. Cocoa grown in a sustainable multi-layer forest system has a good economic potential. Considerable increase of yields has been reported in organic cultivation (EL CEIBO Cooperative - Bolivia, CONACADO Association - Dominican Republic, Facenda Tres Colinas, Agrossilvicultura Ltda.-Brazil). Up to more than 1000 kg dry beans/ha has been achieved by organic cocoa farmers in Bolivia and Brazil without any external inputs. Additionally, it holds an enormous potential for environmental and cultural conservation in regions under intense pressure from conventional monocrop agriculture (Milz, J. personal observations, Schulz, B. et al. 1994).

A large diversity of species is important for the stability of the agroforestry ecosystem. Each tiap spesies menempti ruang yang diberikan, untuk jangka waktu tertentu, dimana spesies tersebut berkontribusi dengan kapasitasnya yang khusus untuk meningkatkan dan mengoptimalkan kondisinya, bersama dengan anggota lain dari spesies yang sama untuk tumbuh dan berkembangbiak. Seiring dengan berjalan waktu, tiap spesies, dengan melakukan fungsi mereka masing-masing, menciptakan kondisi yang diperlukan untuk berkembangnya spesies lain (yang lebih demanding) yang menjamin tetap berjalannya dinamika energi, air, dan unsur hara tersebut. Sebagai hasilnya, alam menciptakan sistem yang terus-menerus semakin kompleks, yang mengakibatkan keberagaman bentuk.(Götsch, E. 1994; Milz, J. 2002; Milz, J. 2006; Schulz, B. 1994; Schulz, B. et al. 1994).

“Dengan mengerti dan mengambil keuntungan dari prinsip-prinsip yang mendasari suksesi alam, kita bisa menghasilkan jumlah produksi yang besar dari sektor pertanian dan hutan tanpa menggunakan bahan kimia atau melawan “penyakit” dan “hama.”


Siklus hidup tanaman kakao bisa berlangsung lebih dari seratus tahun. Kakao yang tumbuh menggunakan sistem hutan yang berlapis-lapis (multi-layer forest system) memiliki potensi ekonomi yang baik. Peningkatan jumlah produksi yang cukup besar dengan menggunakan sistem organik pernah dilaporkan di Bolivia dan Brazil (EL CEIBO Cooperative - Bolivia, CONACADO Association - Dominican Republic, Facenda Tres Colinas, Agrossilvicultura Ltda.-Brazil). Lebih dari 1000 kg kakao kering per hektarnya berhasil diproduksi oleh petani kakao organik di Bolivia dan Brazil, tanpa input eksternal. Selain itu, sistem organik juga memiliki potensi besar dalam konservasi lingkungan dan budaya di daerah yang mendapat tekanan berlebih dari sistem pertanian monokultur. (Milz, J. pengamatan sendiri, Schulz, B. et al. 1994).
individual occupies an appropriate niche and thereby fulfils a particular eco-physiological function within the system. The more complex the design of an agro-ecosystem the fewer interventions are required to regulate diseases and pests in cocoa production: (Götsch, E. 1994; Milz, J. 2006; Osterroth, M.; Osterroth, M. 2002; Peneireiro Mongeli, F. 1999).

"Agroecology is a knowledge-intensive approach. It requires public policies supporting agricultural research and participative extension services….States and donors have a key role to play here. Private companies will not invest time and money in practices that cannot be rewarded by patents and which don’t open markets for chemical products or improved seeds.” (Schütter do, O. 2011).

Situation of the Cocoa Production at the Malinau and Kapuas Hulu Districts

Kapuas Hulu and Malinau as two of three pilot districts of the FORCLIME Programme have declared themselves as conservation districts.

Malinau District

In the district of Malinau cocoa production started in 1980s with a considerable support from the local and central government authorities. Cocoa was mainly produced by small scale farmers who adopted techniques and practices (pre and post harvest) from the nearby Sabah Province, Malaysia.

Shade trees are mostly absent on the cocoa fields. There is no organic matter provided by other trees than cocoa. However, the global aspect of the plantations is deplorable and die back of the trees will still continue even if external inputs like mineral fertilizer and pesticides are increased.

Produksi Kakao di Kabupaten Malinau dan Kapuas Hulu

Kapuas Hulu dan Malinau adalah dua dari tiga kabupaten percontohan FORCLIME yang telah mendeklarasikan kabupatennya sebagai kabupaten konservasi.

Kabupaten Malinau

Di Kabupaten Malinau, produksi kakao dimulai pada tahun 1980, dengan bantuan dari pemerintah setempat dan pemerintah pusat. Kakao terutama diproduksi oleh petani berskala kecil yang mengadopsi teknik dan praktek (pra dan pasca panen) dari Provinsi Sabah, Malaysia.
Figure 3. Cocoa distribution in District of Malinau

Gambar 3. Distribusi Kakao di Kabupaten Malinau
Currently there are about 6,000 Ha of cocoa plantation in Malinau. The cocoa plantations visited during the mission can be characterized as follows:

Saat ini terdapat sekitar 6,000 Ha perkebunan kakao di Malinau. Perkebunan kakao yang dikunjungi memiliki ciri-ciri sebagai berikut:

Figure 4.
Young plantations between 2 and 7 years old without any shade trees

Gambar 4.
Perkebunan kakao, antara 2-7 tahun, tanpa tanaman/ pohon peneduh

Figure 5.
Overall deplorable phytosanitary aspect, presence of symptoms of "dieback" due to lack of shade and probably VSD (Vascular Streak Dieback)

Gambar 5.
Aspek fitosanitasi secara keseluruhan sangat memprihatinkan, adanya gejala "dieback" karena kurangnya tanaman peneduh dan kemungkinan penyakit VSD (Vascular Streak Dieback)
Figure 6. Presence of cocoa stem borer

Gambar 6. Adanya ulat penggerek batang kakao (cocoa stem borer)

Figure 7. Extremely high pressure of weeds

Gambar 7. Tekanan yang sangat tinggi akibat gulma
Figure 8. Frequent use of Herbicides, Pesticides and Mineral Fertilizer (donation from the local district government)

Gambar 8. Seringnya penggunaan herbisida, pestisida, dan pupuk kimia (sumbangan dari Pemda)

Figure 9. Few plantations are over shaded or not stratified

Gambar 9. Beberapa perkebunan memilki tanaman peneduh yang berlebihan atau tidak terstruktur
The situation of the visited cocoa plantations is valued as critical to very critical. The unshaded cultivation leads to a high weed pressure. The subsidized available provision of herbicides, pesticides and mineral fertilizers leads to a partially extremely high use of these means of production. Since the cause of these problems is not resolved, this leads to a further aggravation of the situation. The consistently very poor appearance of the young plantations is attributable to that.

The pesticides and fertilizers are free for the producers, but the application of these substances also represents a high cost factor.

Concerning this, an example of one of the communities visited:

- Annual use of herbicides, 18 l / ha
- 1 l herbicide for 6 tanks of backpack sprayer
- Price for application of a full tank = Rp10,000,-
- Cost of herbicide spraying 1 l = Rp 60,000,-
- 18 l/ha/year = Rp 1,080,000,-
- Cost of pesticide sprayings / year were reported, with about Rp 500,000,-
- Total costs for herbicide and pesticide sprays Rp 1.58 million.-
- Selling price per kg of cocoa around Rp 18,000.-

= Approximately 88 kg of dry cocoa / ha costs for pesticide sprayings

The still predominantly young cocoa plantations that are slowly coming into earnings will therefore generate no surpluses. Furthermore, it is anticipated that there will be another “cocoa trauma” for the cocoa farmers, because most of the visited cocoa plantations will not even reach the age at which Pohon peneduh umumnya tidak ditemukan di perkebunan yang dikunjungi. Tidak ada materi organik lainnya yang ditambahkan selain materi organik dari tanaman kakao. Kondisi perkebunan secara umum sangatlah memprihatinkan, dan gejala “dieback” pada tanaman kakao masih akan terus berlangsung walaupun penggunaan pupuk kimia dan pestisida ditingkatkan.


Pestisida dan pupuk kimia didapatkan secara cuma-cuma oleh para petani, namun penggunaannya memerlukan biaya yang besar.

Contoh biaya yang diperlukan untuk penggunaan pestisida dan herbisida oleh salah satu kelompok tani yang dikunjungi:

- Penggunaan herbisida per tahun: 18 l/ha
- 1 l herbisida untuk 6 tangki tas penyemprot
- Biaya penyemprotan 1 tanggal penuh = Rp10.000,-
- Biaya penyemprotan 1 l herbisida = Rp 60.000,-
- 18 l/ha/tahun = Rp 1.080.000,-
- Biaya penyemprotan pestisida/tahun dilaporkan sekitar Rp 500,000,-
- Total biaya untuk penyemprotan herbisida dan pestisida = Rp 1,58 juta.-
- Harga jual kakao per kg adalah Rp. 18,000

= Sekitar 88 kg kakao yang sudah dikeringkan/ba diperlukan untuk membiayai penyemprotan pestisida
normally the full production phase (ex. Ca 10. Year after planting) starts. The cocoa production collapsed in the 1990s in Malinau due to a disease. Most cocoa produced in Malinau District was sold to Malaysia.

Kapuas Hulu District

The situation of cocoa production in the district of Kapuas Hulu is quite different. Cocoa production started many years ago in Kapuas Hulu and some remaining plants of old cocoa plantations (early 1970s) are still in production.

Cocoa farmers started to produce cocoa in 2008, as many as 83 ton/year. The production has increased to 88 ton/year in 2010. Recently, there are 395 farmers from 10 villages in Kapuas Hulu District that produce cocoa as much as 91 ton/year on total area of 409 ha. Nevertheless, the plantations were not well maintained, and some problems such as low quality of production, lack of information and education, and crop damage from pests and diseases still occur. Most of the farmers at Lintas Utara slashed and burned their cocoa trees to be converted to rice field (ladang) due to the low profit received from the market (Malaysia) during the past 5 years. Now, farmers at Lintas Selatan and Lintas Utara have started to produce cocoa again and have sold it to the Indonesian market, and majority of the farmers are staying in the proposed areas for REDD demonstration activities.


Kabupaten Kapuas Hulu


In early 2011, the local government of Kapuas Hulu District would like to support and bring up to surface the cocoa production programme. It emphasizes on cocoa production in the district, production of non-timber forest products, and reduction of the district’s dependency on the dominant rubber production. This sustainable cocoa production programme will also be proposed to KfW and the central government in 2012 with budget coming from Dinas Perkebunan dan Kehutanan Kapuas Hulu.

**Recommendations**

1. Establishment of a baseline of existing cocoa growing areas, age of the plantations and yields,
2. Identification of complementary crops for integration into cocoa farming systems (pepper, vanilla, ginger, turmeric, rubber, etc.),

**Rekomendasi**

1. Penyusunan baseline mengenai daerah-daerah yang sudah digunakan untuk memproduksi kakao, umur perkebunan dan jumlah produksi,
2. Identifikasi tanaman-tanaman lain yang dapat diintegrasikan kedalam sistem perkebunan...
3. Identification of timber trees, based on the dominant tree species of the local forest ecosystem,

4. Development of a plan for stepwise conversion of monoculture cocoa plantations in diversified dynamic agro-forestry systems. This includes:

5. Development of efficient agricultural extension service structures,

6. Implementation of different complex agroforestry plots in each region for training and farmer field schools,

7. Training of technicians and farmers, which can be used as local advisers,

8. Organization of necessary planting material,

9. Redeployment of existing resources (authority) to subsidize fertilizers and pesticides for availability of seeds (Canavalia ensiformis, Cajanus cajan, Bixa orellana, timber trees) and infrastructure (drying equipment, fermentation boxes),

10. Measures to improve the quality of cocoa (fermentation, drying)

11. Exploring of meaningful certification systems (Rainforest Alliance, Organic, Bird Friendly, etc.) according to market demands,

12. Establishment of structures for regional commercialization points,

13. Alliances with potential cocoa buyers (i.e. Cocoa Horizon Program of Barry Callebaut – Switzerland)

14. Development of a practical guide (manual) for sustainable cocoa farming,

15. Compiling a list of locally known fruit, timber, medical and food plants.
The proposed successional agroforestry systems are characterized by great dynamism. For many advisers and farmers, it also means a “paradigm shift”, because it is completely contrary to the previously recommended cultivation techniques. This means that an extension program with such content has to adapt systematically to the development of agro-forestry plantations and the technicians and farmers have to be accompanied technically and methodologically over a period of 3 - 5 years. Furthermore, it is likely that the questioning of agro-chemical inputs may also cause resistance and conflicts of interest.

Short-term measures to improve the cultivation of cocoa, as they were demonstrated during the field visits, should be practically expanded rapidly through farmer-to-farmer exchange programs. This will allow a rapid expansion of the proposed methods.

The measures practiced during the field visits already show (6 to 8 months) visible improvements of the cultivation areas, although important tools such as *Cajanus cajan* and *Bixa orellana* were not available.

The establishment of agroforestry demonstration and training plots will be a key element for these efforts, especially considering the dynamic development of these systems. This approach should be accompanied during a couple of years by consultants specialized on this topic.

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Sistem *successional agroforestry* yang diajukan memiliki karakteristik yang sangat dinamis. Bagi sebagian besar pembimbing dan petani, sistem ini juga berarti “pergeseran paradigma,” karena sangat bertolak belakang dengan teknik-teknik yang direkomendasikan sebelumnya. Ini berarti program-program pengembangan yang mengedepankan sistem agroforestri harus bisa beradaptasi secara sistematis dengan perkembangan perkebunan agroforestri. Pembimbing dan petani juga harus didampingi secara teknis dan metodologis selama 3-5 tahun. Lebih dari itu, bukanlah hal yang tidak mungkin bila hal ini, yaitu sistem agroforestri yang mempertanyakan penggunaan bahan kimia untuk pertanian, memicu pertentangan dan konflik kepentingan.

Langkah-langkah jangka pendek untuk memperbaiki sistem budidaya kakao, seperti yang didemonstrasikan selama kunjungan lapangan, harus secara praktis disebarluaskan dengan cepat melalui program pertukaran petani ke petani. Hal ini akan menyebabkan metode-metode yang diajukan dengan lebih cepat.

Langkah-langkah yang dipraktekkan selama kunjungan lapangan sudah mulai memperlihatkan hasil (6-8 bulan) di kawasan budidaya kakao, walaupun tanaman-tanaman pendukung yang penting seperti *Cajanus cajan* dan *Bixa orellana* belum tersedia.

Adanya plot-plot sebagai kawasan percontohan dan pelatihan agroforestri menjadi elemen kunci bagi keberhasilan upaya ini, terutama karena melihat begitu dinamisnya perkembangan sistem agroforestri. Pendekatan ini perlu didingdi selama dua tahun oleh konsultan yang memiliki spesialisasi di topik terkait.
Literature References

Caron, C., Lemieux, G., Lachance, L., 1996. Regenerating Soils with Ramial Chipped Wood. Laval University, Faculty of Forestry and Geomatics, Québec.


Lemieux, G., 1996. The Hidden World that Feeds Us: the Living Soil. Laval University, Faculty of Forestry and Geomatics, Québec.


## Terms of Reference (TOR)

### Objective:
Development of a Strategy for sustainable cocoa production based on natural succession and considering biodiversity and climate change aspects within the Conservation District of Malinau based on a comprehensive and practical orientation of cocoa farmers and local stakeholders by implementing 5 pilot plots in the corresponding District.

### Time Frame:
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<tr>
<th></th>
<th>01.09. 2011</th>
<th>20.12.2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time Frame</td>
<td>10 working days within the period</td>
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</table>

### Milestones and outputs:
- Outline and transfer of knowledge regarding sustainable cocoa production and market perspectives to corresponding District authorities and producer stakeholder
- Identification and implementation of at least 5 pilot plots for sustainable cocoa production considering the modell of natural succession
- Identification of potential cocoa production sites (priority on bufferzones of national parks)
- Outline on organizational and management requirements for further technical assistance
- Workshop on sustainable cocoa production and strategy development

### Background:
The Indonesian-German Forests and Climate Change Programme supports the Indonesian Government and relevant public and private actors in developing and implementing the institutional and regulatory framework, methods and services for sustainable forest management, nature conservation and the reduction of greenhouse gas emissions from deforestation and forest degradation.

The Programme pursues this objective via three components: (1) Policy advice, strategy development and institution building at national level, (2) Implementation of strategic action plans for sustainable forest management, (3) Promotion of nature conservation and sustainable development in bio diverse areas in the Heart of Borneo (HoB). The consultancy is carried out within Component 3.

In coordination with the corresponding District authorities, stakeholders and GIZ-FORCLIME Component 3 it was proposed to support the development of a sustainable cocoa production strategy in the conservation district of Malinau. Cocoa production in Malinau has a significant potential for improving livelihoods of a wide range of families.

The practical implementation of pilot plots is directly related to indicator 4 of component 3 (improving livelihood, PES, community benefits from protected areas).

### Organization:
The consultant reports to Director of Perlindungan Hutan dan Konservasi Alam (PHKA), District Authorities and the GIZ Program Director in charge of the BMZ-commission.
### Tasks:

The following tasks provide a framework and can be adjusted during the course of the consultancy to the degree necessary.

1. **Screening of available documents**: in coordination with corresponding district authorities, organised civil society and stakeholders review and screening of available documents in Malinau in order to identify references regarding sustainable cocoa production.

2. **Outline of relevant best management practices and transfer of knowledge regarding sustainable cocoa production to corresponding District authorities and producers**: conceptualization and conduction of an initial workshop with PEMDA, NGO and interested stakeholders.

3. **Survey and identification of current cocoa plantations in the district areas**: systematization of experiences and mapping of cocoa plantations.

4. **Survey and identification of potential sustainable cocoa production sites (priority on bufferzones of national parks)**: list, map and recommend potential sites for cocoa sites, Potential side effects: identification of existing best management practices in Malinau.

5. **Outline of five pilot cocoa plots and documentation**: installation and rehabilitation of cocoa plantation with in the district of Malinau.

6. **Workshop on sustainable cocoa production strategy**: Development of a concept and method for sustainable cocoa production strategy development based on findings throughout the survey.

### References:

The coordination of this survey with district authorities will be supported by FORCLIME Component 3.

### Duration and likely travels

| Travelling to Malinau District | 10 working days |
### Annex 2.

#### Activities

<table>
<thead>
<tr>
<th>Date</th>
<th>Agenda</th>
<th>No. of Participants</th>
<th>Note</th>
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<tr>
<td><strong>Saturday, 08 October 2011</strong></td>
<td>Presentation By Marc Peters PT. Bambu Nusa Verde</td>
<td>8</td>
<td>Follow up visit on Bamboo production in Kapuas Hulu</td>
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<td><strong>Sunday, 09. October 2011</strong></td>
<td>Travelling via Balikpapan and Tarakan to Malinau</td>
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</table>
| **Monday, 10 October 2011** | 8.00 am  
Meeting & socialization with  
- Mr. Lawin Liban (Kepala Dinas Perkebunan)  
- Mr. H. Karmani. AMD ( Kepala Bidang Perkebunan)  
- Mr. Yance Nikolas, S. Hut  
9.00 am  
Visit to Pelita Kanan Village office (kepala desa)  
- Interview with farmers  
- Presentation of objectives sustainable cocoa production  
11.00 am  
Visit Pelita Kanan cocoa farm  
1 facilitator  
3 Giz  
1 WWF  
1 Dinas  
10 farmers  
3.00 pm  
Visit to Pulau Sapi Village  
1 facilitator  
3 Giz  
1 WWF  
1 Dinas  
4 PPL  
9 farmers  
7.00pm  
Meeting with Camat from 5 sub-districts  
1 Facilitator  
4 Giz  
1 WWF  
4 Camat  
9.00 pm  
Dinner | 27 | Venue: PEMDA Malinau – Kalimantan Timur                                      |

Farmer’s Owner:
- Mr. Paulus Belapang

Farmer’s Owner:
1. Mr. Yusuf, A.Ma.Pd
2. Mr. Hassanudin Murang

Venue: Hotel Mahkota
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<th>Events</th>
<th>Facilitators</th>
<th>Farms Owners</th>
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<tr>
<td>Tuesday, 11 October 2011</td>
<td>8.00 am</td>
<td>Reviewed by Mr. Heinz Terhorst about activities on Monday, 10 October 2011 with Participant from Kapuas Hulu</td>
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<td></td>
<td>9.00 am</td>
<td>Visit to Kuala Lapang Village</td>
<td>1 facilitator</td>
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<td>3 GIZ</td>
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<td>4 Kapuas Hulu</td>
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<td>5 Dinas penyuluh</td>
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<td>5 PPL</td>
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<tr>
<td>Wednesday, 12 October 2011</td>
<td>9.00 am</td>
<td>Visit to Mentarang Baru Village</td>
<td>1 Facilitator</td>
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<td>3 GIZ</td>
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<td>4.00 pm</td>
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<td>3 GIZ</td>
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<td>1 WWF</td>
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<td>4 kapuas Hulu team</td>
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<td>1 Farmers</td>
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<td>2 dinas Penyuluh</td>
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<td>9.00 am</td>
<td>Visit to Pulau Sapi Village</td>
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<td>4 kapuas Hulu team</td>
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<td>15 Farmers</td>
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<td>1 dinas Penyuluh</td>
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<td>6 PPL</td>
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<td>4 team from PT Bumi Tanggerang (cocoa Buyer)</td>
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<td></td>
<td>7.00 am</td>
<td>Training for Agro forestry department</td>
<td>1 Facilitator</td>
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<td></td>
<td>28 Petugas Pemantau Lapangan (PPL)</td>
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<td>3 Dinas Perkebunan Malinau</td>
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<td>4 kapuas Hulu team</td>
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</table>
| Saturday, 15 October 2011 | Visit to Pelita Kanaan Village  
|                         | Demonstration Plot                                                        | 1 Facilitator  
|                         |                                                                          | 3 GIZ  
|                         |                                                                          | 1 WWF  
|                         |                                                                          | 1 Dinas  
|                         |                                                                          | 20 Farmers  
|                         |                                                                          | 4 kapuas hulu team  
|                         |                                                                          | Farm's Owner: Mr. Marthin |
| Sunday, 16 October 2011  | Flight to Jakarta                                                         |                                     |                |
| Monday, 17 October 2011  | Report                                                                    |                                     |                |
| Tuesday, 18 October 2011 | Debriefing and meeting with Rolf Krezdorn and Helmut Dotzauer,  
|                         | Flight to Kuala Lumpur-Frankfurt                                           |                                     |                |
Growth of the demonstration plots in pictures

Location:
Farmer’s land in Pulau Sapi, East Kalimantan

Pertumbuhan tanaman di dalam plot demonstrasi dalam gambar

Lokasi:
Lahan petani di Pulau Sapi, Kalimantan Timur
Caca demonstration plots: Multi-strata agroforestry at Kebun Pak Mika, Pulau Sapi
Successional Agroforestry Systems for Sustainable Cocoa Production

Cacao demonstration plots: Multi-strata agroforestry at Kebun Pak Mika, Pulau Sapi

13.11.2011
13.01.2012
07.02.2012
Cacao demonstration plots: Multi-strata agroforestry at Kebun Pak Markus

11.11.2011
11.12.2011
11.01.2012
11.02.2012

Sistem Successional Agroforestry untuk Produksi Kakao Berkelanjutan