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ROADMAP TOWARD

SUSTAINABLE MANAGEMENT AND CONSERVATION OF RAMIN (*Gonystylus* spp.)

Cooperation between
International Tropical Timber Organization (ITTO)-CITES
and
Directorate of Biodiversity Conservation
Directorate General of Forest Protection and Nature Conservation
Ministry of Forestry

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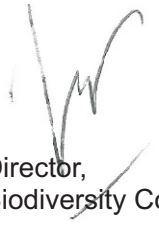
FOREWORD

Ramin (*Gonystylus* spp.) consists of 30 species or more and distribute naturally in Indonesia. Population of these species is naturally rare and some species are decreasing due to various disturbances, such as excessive harvest, illegal logging, forest fire and conversion of habitats to other non-forest uses. Efforts to ensure sustainable management and conservation have been developed. However, they are still insufficient and not fully implemented.

In relation to that, Ministry of Forestry with the financial assistance from ITTO-CITES PROJECT, develops a roadmap. This roadmap is aimed at ensuring the achievement of sustainable management and conservation by implementing strategic approaches and action plans.

In this roadmap, five issues and their associated strategy and action plans are described. The achievement of sustainable management and conservation, of course, is highly dependent on the responsible authorities in the execution of this roadmap.

Jakarta, January 2011



Director,
Biodiversity Conservation

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This roadmap is prepared by using all existing data information available today and primarily from the findings of ITTO Projects, ITTO-CITES Project and other research and developments carried by various institutions including universities and NGOs.

We would like to thank Mr. Agus Sutito and Ms. Badiah who facilitate the preparation, the discussion and the improvement of draft from initial stage to final version. The appreciations are also directed to participants of the workshops and discussion meeting who have given their valuable inputs to improve the content of this roadmap. They are Prof. Bismark, Prof. Tukirin Partomihardjo, Dr. Istomo, Dr. Teguh Triono, Mr. Trio Santoso, Mr. Agus Sutito, Ms. Faustina Ida Hardjanti, Dr. Yayat Afianto, Ms. Badiah, and Mr, Muhammad Mansur. To others who have given their contribution until the completion of this roadmap deserve great appreciation.

Finally, we hope this roadmap is useful for many who are preparing programs and development plan towards the achievement of sustainable management and conservation of ramin.

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I. INTRODUCTION

1.1. Background

Indonesia is rich with species diversity including flowering plant species. Approximately 400 species out of those species, have been classified as timber having economic value and 250 of which have been commercially traded in domestic and international market (Soerianegara and Lemmens, 1992). One of the genera is *Gonystylus,* widely known as ramin. *Gonystylus* distributes naturally in Indonesian tropical peat swamp forests in Sumatra and Kalimantan (Figure 1). Species of this genus are now facing problems caused by excessive harvest, primarily illegal logging, forest fires, conversion and other human settlement. The problems include habitat degradation, population depletion and fragmentation which cause great reduction in growing (standing) stock, capacity for natural regeneration, tangible and untangible benefit contributed to local community and national economy.

If the problems persist and no immediate intervention is taken, ramin forest and potency will continue degrading and or even lost. In order to reduce the pressure and to prevent further degradation and lost, Ministry of Forestry issued ramin logging moratorium in 2001 nationwide. The species of this genus are listed in Appendix III of CITES in 2001 and later in Appendix II to avoid excessive harvest through the control its international trade.

Ramin is still a popular timber and the demands are especially from European countries. This timber possesses unique wood characteristic, easy to work with and relatively durable. The weakness of that these species, especialy *Gonystylus bancanus*, is slow growing, require specific site for early growth and poor seed production. The opportunity of this species is that this species could be vegetatively propagated from cuttings, some natural populations are still available for being the sources of seeds.

The above problems are related to (1) the inefficient management of ramin resource and conservation, (2) the presence of barriers in the restoration and rehabilitation of ecosystem and habitats and plantation of ramin, (3) the inefficient timber harvest, processing and trade system, (4) limited public participation and funding supports and (5) weak implementation of policies, rules and regulation, as well as human resource capacity.

1.2. Relevant to National Forest Strategy

This roadmap is directed to support the achievement of target set out in the Long Term Development Plan in Forestry (RPJP, 2006-2025), especially those related to the improvement of capacity of forestry institution (Point 1), the importance on the promotion of forest resource productivity and its product added value (Point 2), where ramin is one of the high value commercial timbers, and the necessity to improve community prosperity and participation in forest management (Point 5). The latter is also an important part in the achievement of Sustainable Forest Management (SFM) and conservation.

This roadmap is also linked to the National Forestry Planning (RKTN, 2010-2029), that under this planning, all forest areas are expected to be well managed by 2029 (Expected Condition no.1), forest multifunctions, such as for timber production, protection and conservation, are restored (Expected Condition no 2), and rehabilitation and restoration of the degraded forest areas are successfully achieved (Expected Condition no.3).

The efforts toward the SFM and conservation of ramin and its Peat Swamp Forest (PSF) habitat are relevant to the global concern as highlighted in various conventions, such as CITES, CBD and Ramsar/*The Convention on Wetlands of International Importance* (1971). Ramin has been listed in Appendix II of CITES as mentioned earlier.

1.3. The Objective

This roadmap is aimed to provide guideline and direction toward the achievement of sustainable management and conservation of ramin by providing strategic intervention and action plan to be taken as primary reference by relevant stakeholders.

The overall objective is to prevent further loss and degradation of ramin population and habitats and to restore ramin timber production and great economic revenue, through:

1. The improvement of sustainable management of ramin resources and conservation.
2. The enhancement of restoration, rehabilitation and conservation activities.
3. The improvement of processing efficiency, trade system and added value products.
4. The promotion of the involvement of stakeholders and funding supports.
5. The improvement of policies, rules, regulation and institutional capacity.

1.4. The Targets

The several targets are:

1. The rate of degradation of ramin habitats reduced. Ramin habitats include production forest, conservation areas (National Park and Nature Reserves), protected areas and other special purpose forest areas, such as research and educational forest.
2. Ramin timber production is recovered to earlier condition, even better through the implementation of sound management.
3. The existing degraded ramin habitats and population recovered and restored through consistent rehabilitation and plantation programs.
4. The revenue and income from ramin related timber production and trade recovered and improved through the application of sound technology from harvesting, processing and trade.
5. Stakeholder participation and supports increased through awareness raising, compaign and capacity building.
6. The existing policies, rules and regulation improved and consistently implemented.
7. Institutional and human resource capacity in implementation of policies, rules and regulation improved.

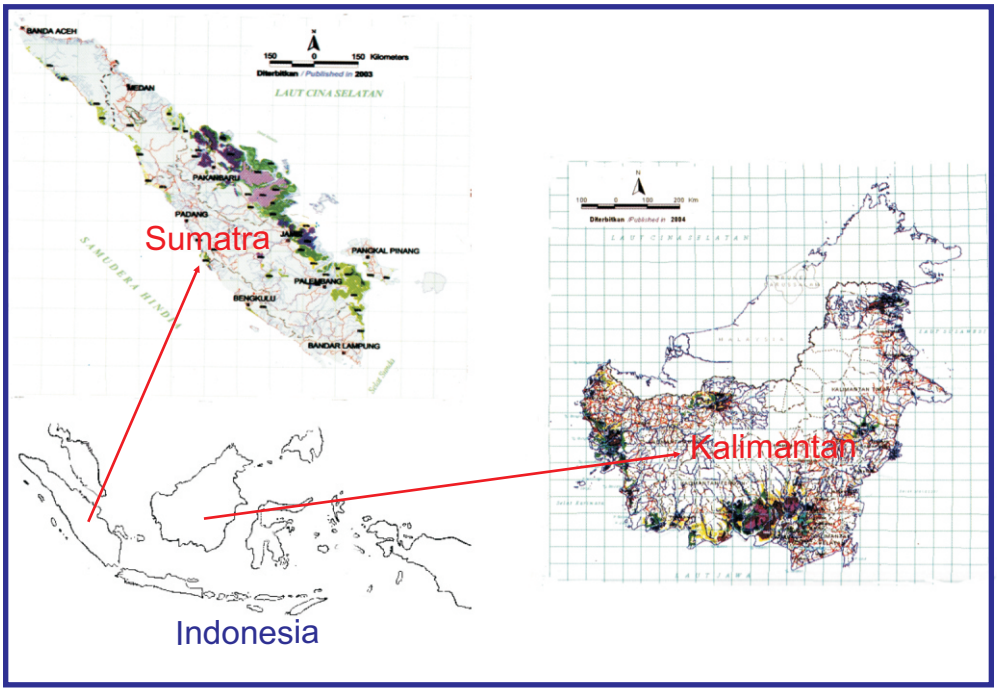

Figure 1. The distribution of *Gonystylus* species in Sumatra, Java, Kalimantan, Sulawesi and Irian Jaya (West Papua). *G. bancanus* is currently found in Riau, Jambi and South Sumatra for Sumatra distribution and West and Central Kalimantan for Kalimantan distribution.

II. RAMIN NATURAL RESOURCES

2.1. Population Distribution

Gonystylus spp. consists of approximately 30 species or more depending on its taxonomic interpretation (Airy Shaw, 1976; Sidiyasa, 2005). These species distribute naturally in Sumatra, Java, Kalimantan, Sulawesi, and West Papua (Figure 1). Depending on its individual species, the habitat ranges from lowland to hill forest areas. Based on recent field survey in selected sites in Sumatra, Java and Kalimantan, there are up to 10 species of *Gonystylus* found. From that field survey it indicates that most of the species are rare in their natural distribution, *except G. brunnescen and G. bancanus. G. brunnescen w*as found relatively abundant in East Kalimantan (Triono *et al.,* 2010) and *G. bancanus* is found in a wide range of distribution in peat swamp forest of Sumatra and Kalimantan.

2.2. Species Characteristics

Species within *Gonystylus* ranges from shrub, small tree until large size tree with total height reachs up to 40 meter. The naturally growing species in Indonesia are found from small tree to large size trees (Table 1). *G. keithii*, which was mentioned as shrub or small tree in earlier review by Airy Shaw (1972), based on recent field survey and identification by Triono *et al* . (2010), this species is found as large tree and its timber could be used for various wood-base products or light construction (Table 1).

Table 1. *Gonystylus* species found based on recent field survey in selected sites in Jambi (Sumatra), West Java and Kalimantan by Triono *et al* ., 2010.

No.	Species name	Size/height	Distribution	Potential use*
1	*G. affinis* (Syn *G. beccarianus)*	Tree, 9-24 m	East Kalimantan	Light construction
2	*G. brunnescen*	Tree, 13-18 m	East Kalimantan	As timber
3	*G. confusus*	Tree, 15-30 m	Sumatra*, West Kalimantan	As timber
4	*G. consanguineus*	n/a	Kalimantan	n/a
5	*G. forbesii*	Tree, 20-40 m	Sumatra*, Kalimantan	Wood
6	*G. keithii*	Shrubs/small tree	Kalimantan	Fish poison
7	*G. macrophyllus*	Tree,~45 m	West Java	Small boxes
8	*G. velutinus*	Tree, 23-35 m	Jambi (Sumatra)*, Bangka-Belitung*, Kalimantan	Timber, furniture
9	*G. bancanus**	Tree, 18-42 m	West and Central Kalimantan	timber

*Based on existing information and Airy Shaw (1972).

2.3. Growth and Potential Standing Stock

There is no information available for the growth and standing stock of *Gonystylus* species other than *G. bancanus*. The growth and standing stock of ramin (*G. bancanus*) and other associated species are presented in Table 2.

Generally, the growth of PSF species is relatively slow. The table shows the average growth of diameter and volume increment of 15 major tree species growing naturally in PSF observed in PT. Diamond Raya Timber (DRT). Ramin (*G. bancanus*) is one of the slowest growth compared to other species in PSF with the average diameter increment of 0.38 and volume increment of 0.30 m^3 for tree with diameter of 20 cm and above. Some species, such as geronggang (*Cratoxylum arborescens*), pisang-pisang (*Mezzetia parviflora*), punak (*Tetramerista glabra*) and bintangur (*Callophylum soulatri*) are the relatively fast growing species recorded in PSF.

Table 2. Diameter and volume increment for some PSF tree species recorded in PT. DRT (Istomo, 2009)

No.	Species	Θ increment (cm/year)	Volume increment (m^3/ha/year)		
			Θ 20-39 cm	Θ>40 cm	Θ>20 cm
1	Balam (*Palaquium obovatum*)	0.36	0.20	0.09	0.29
2	Bintangur (*Calophylum soulatri*)	0.58	0.15	0.04	0.19
3	Durian burung (*Durio carinatus*)	0.34	0.07	0.13	0.20
4	Geronggang (*Cratoxylum arborescens*)	0.70	0.12	0.16	0.28
5	Jangkang (*Xylocarpus malayana*)	0.25	0.11	0.00	0.11
6	Meranti batu (*Shorea uliginosa*)	0.42	0.22	0.22	0.44
7	Meranti bunga (*Shorea teysmaniana*)	0.61	0.24	0.29	0.51
8	Pasak linggo (*Aglaia rubiginosa*)	0.35	0.05	0.07	0.12
9	Pisang-pisang (*Mezzetia parviflora*)	0.66	0.22	0.24	0.46
10	Pulai (*Alstonia pneumatophora*)	1.50	0.05	0.03	0.08
11	Punak (*Tetramerista glabra*)	0.60	0.06	0.26	0.32
12	**Ramin (*Gonystylus bancanus*)**	**0.38**	**0.18**	**0.12**	**0.30**
13	Serapat (*Callophylum macrocarpum*)	0.40	0.09	0.00	0.09
14	Suntai (*Palaquium pierre*)	0.56	0.07	0.13	0.20
15	Terentang (*Camnosperma macrophylla*)	0.66	0.25	0.07	0.32

Source: Istomo (2009).

Standing stock of all trees recently surveyed in secondary PSF of Sebangau National Park, Central Kalimantan, for diameter above 40 cm is 97 m^3 or 151 tree per ha. Ramin standing stock is approximately 2 m^3/ha or about 4 tree per ha. Based on survey in primary PSF in PT. DRT, Riau (Sumatra), the standing stock of all species for diameter above 40 cm is approximately 185 m^3 per ha and ramin standing stock is 9.2 m^3 per ha or 5 trees per ha (Samsuri *et al.*, 2010). The standing stock of ramin has been decreasing in most forest areas, especially in secondary forests (logged over and ex-burned forest areas) and ex-illegal logging.

2.4. Habitat Preference and Association with Other Species

Species of *Gonystylus* are naturally found in primary forests, from lowland to medium elevation reaching up to 1200 m (in Sumatra) and even until 1500 m above sea level in Borneo and the Phillippine (Soerianegara and Lemmens, 1994). *Gonystylus* species are found growing in a wide range of topography and habitat types, whereas *G. bancanus* is naturally found in lowland peat swamp forests in Sumatra and Kalimantan. Field survey conducted in PT. DRT in Riau (Istomo *et al.*, 2010) indicated some associated species with *G. bancanus* are Balam (*Palaquium obovatum*), Bintangur (*Calophylum soulatri*), Durian burung (*Durio carinatus*),Geronggang (*Cratoxylum arborescens*), Jangkang (*Xylocarpus malayana*), Meranti batu (*Shorea uliginosa*), Meranti bunga (*Shorea teysmaniana*), Pasak linggo (*Aglaia rubiginosa*), Pisang-pisang (*Mezzetia parviflora*), Pulai (*Alstonia pneumatophora*), Punak (*Tetramerista glabra*), Serapat (*Callophylum macrocarpum*), Suntai (*Palaquium pierre*) and Terentang (*Camnosperma macrophylla*) in PSF. In Central Kalimantan and West Kalimantan, the associated species are slightly different. In these locations, *Shorea* spp. are the most common species associated with *G. bancanus*.

The PSF is different from dryland forest in that of PSF is characterized with the excess of water, organic materials and mostly with poor accessibility. The presence of excess of water and organic materials has contributed to the forest and vegetation structure and tree species composition for which their method of harvest requires certain treatment which is different from that of dryland forests.

2.5. Natural Regeneration

Natural regeneration

No information available for natural regeneration of species other than *G. bancanus*. For *G. bancanus*, the natural regeneration in primary forest is abundant (Figure 2). In logged over area and other disturbed areas, the natural regeneration vary, but mostly poor. This is because the sources of seeds have been becoming limited and the sites are no longer favorable for natural regeneration.

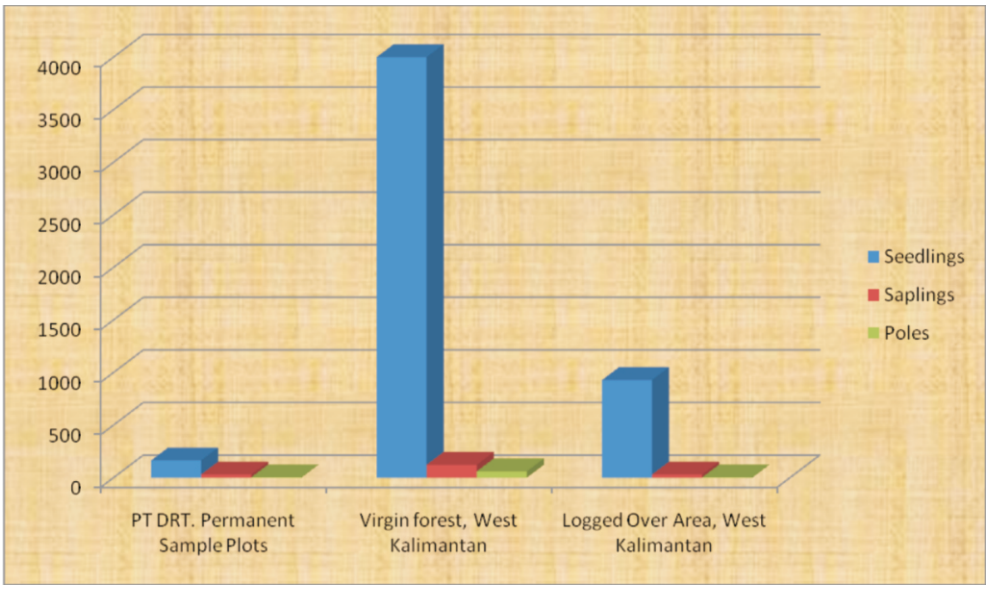

Figure 2. Natural regeneration of *G. bancanus* recorded in different locations.

Regeneration after logging

Illegal logging and repeated forest fires have caused degradation of habitats which makes natural regeneration occur slowly and relatively limited in number. This is due to limited number of mother trees for natural regeneration. This condition has been escalated for some areas which have been encroached by local people and or conversion to other forestry uses.

Research related to logging activities are still required especially to improve operational logging to minimize logging impact on residual stand especially in its relation to natural regeneration, not only for *G. bancanus* but also for other species.

2.6. Ramin Production Forest

Forest in Indonesia is approximately 143 millions ha. Forests allocated for timber production is nearly 60 millions ha, protection-conservation is nearly 19 millions ha and the remaining forests are allocated for non-forestry uses including human related activities. *Gonystylus* species are growing across the all types of those forests with certain site preference. The major and commercially traded species, *G. bancanus,* is growing in PSF.

Peat swamp forest (PSF) in Indonesia has been predicted to be over 13 million ha consisting of production forests, conservation areas, protected and other uses. After nearly three decades of timber harvesting in the allocated production forests, the logged over forests generally tends to decrease in their quality, from slightly degraded to severely degraded indicated by the reduction of standing stock, the number of trees per ha and its natural regeneration. There is also some population depletion in some areas caused by excessive removal of mother trees. Only those unlogged forests remain relatively in better condition, such as in some conservation and protected areas. The primary causes of forest degradation are unsustainable harvest (including illegal logging), repeated forest fires and other human disturbances.

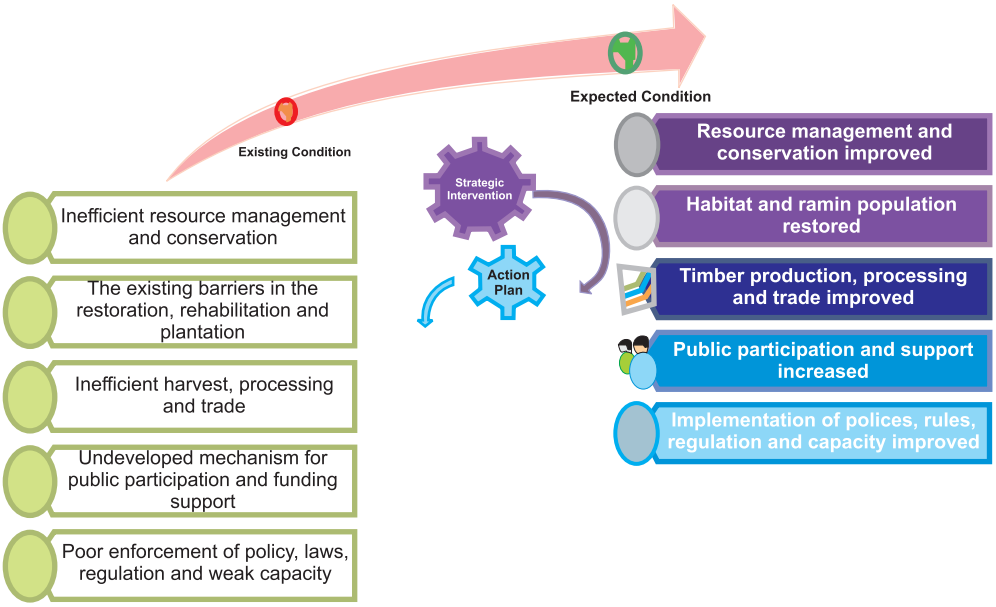

Figure 3. Schematic diagram to the achievement of expected condition from existing condition through the execution of strategic intervention and action plan.

III. EXISTING MANAGEMENT AND CONSERVATION

3.1. Resource Management and Conservation

3.1.1. Production forests

Silviculture system

The harvest of ramin (*G. bancanus*) is using Selective Cutting and Enrichment Planting (Tebang Pilih Tanam Indonesia-TPTI) silvicultural system, which was developed based on diameter limit and cutting cycle. The system which was primarily developed for dryland forests was adopted for timber harvest in PSF with several technical modifications.

One new regulation on silvicultural system was recently issued for both production forests in dryland and peat swamp areas (Ministrial Regulation No. 11, 2009). This regulation regulates the use of different silvicultural system in accordance with forest condition. In this regulation, ramin is allowed to be cut for minimum diameter limit of 30 cm with cutting cycle of 40 years, which was over 40 cm in diameter with cutting cycle of 35 years. However, under this regulation, the cutting for that diameter limit is allowed only after receiving recommendation from research institution. The institution might be asked to carry out field assessment prior to harvesting.

Logging activities

Logging activity for ramin in PSF is now still using less environmentally sound technology, such as logfisher. Log transportation is using simple logging tract, railway or lorry. Due to the high cost for establishment, the railway tract is used and maintained only during the period of logging operation. Afterward, they are (the railway) transfered to the subsequent logging site. The removal of this railway gives significant barrier in the execution of maintenance for residual stands, which is very crucial for logging in PSF. Poor maintenance cause substantial reduction in the potential standing stock. Until today, studies on the efficiency of operational logging using the existing logging methods and the impact of logging to natural regeneration are still extremely limited.

Figure 4. Log transportation in peat swamp forest using wooden trail (Photo by Istomo).

Concession companies

There are several forest companies currently operating in peat swamp forests. They are concession companies for timber production in natural PSF, Industrial Forest Plantation (HTI), and Palm Oil Plantation. The only natural forest concession company currently granted a permit to harvest ramin is PT. Diamond Raya Timber (in Riau) with concession area of approximately 90,956 ha (Mujijat and Hermansyah, 2005). Other companies are PT. Putra Duta Indah Wood (Jambi) for timber production and RAPP (Industrial Forest Plantation-HTI) for pulp and paper production.

Forest certification (SFM and Chain of Custody)

Under current ramin logging moratorium, only PT. DRT (Riau) is granted a permit to harvest ramin. This company was granted a certificate of sustainable forest management by Indonesian Ecolabelling Institute (LEI). In addition to the SFM certificate, this company was also granted a Chain of Custody (COC) certificate by Forest Stewardship Council.

3.1.2. Protection and conservation

Ramin from *G. bancanus* has been *in-situ* conserved in conservation areas (National Park, Nature Reserve) and protection forest and research-educational forest (Table 3). In addition to the protection and conservation areas, ramin from *G. bancanus* have also been conserved as research trial areas, genepool, arboretum and botanical garden.

G. macrophyllus and *G. affinis* have been limitedly conserved in Bogor Botanical Garden, however, it is still insufficient to protect and conserve their genetic materials. Data and information on *ex-situ* conservation for other *Gonystylus* species are still limited. Some other *Gonystylus* species have been ex-situ conserved in Bogor Botanical Garden and Serpong Arboretum (National Institute of Science Collection). Small scale ex-situ conservation has been established in Research Forest Station in Kemampo, South Sumatra and Tumbang Nusa, South Kalimantan.

Protection of PSF, regardless the presence of ramin inside, has been regulated under the general protection of Peat Swamp Forest. PSF with the thickness of over 3 meters should be protected from various types of conversion. However, in reality this regulation is frequently violated.

Table 3. Distribution of ramin and its habitat in some conservation areas, research forest and trial sites.

No.	Conservation	Location	Appr. area (ha)
1.	Kerumutan Game Reserve	Indragiri Hilir and Indragiri Hulu, Riau	120,000
2.	Tasik Belat Game Reserve	Siak, Riau	2,500
3.	Danau Pulau Besar Game Reserve	Siak, Riau	25,000
4.	Biosphere Reserve Giam Siak Kecil-Bukit Batu, Riau (Wildlife Reserve Giam Siak Kecil, Wildlife Reserve Bukit Batu and peat protected areas)	Siak and Bengkalis Districts, Riau	705,000
5.	Berbak National Park	Tanjung Jabung Timur, Jambi	162,000
6.	Sembilang National Park	South Sumatra	202,896
7.	Padang Sugihan Game Reserve	South Sumatra	86,932

Table 3. (Continued)

No.	Conservation	Location	Appr. area (ha)
8.	Padamaran-Kedaton Trial sites	OKI, South Sumatra	± 10 ha
9.	Mandor Nature Reserve,	West Kalimantan	3,080
10.	Muara Kendawangan NR	Ketapang, West Kalimantan	150,000
11.	Gunung Palung National Park	West Kalimantan	90,000
12.	Danau Sentarum National Park	West Kalimantan	80,000
13.	Tanjung Puting National Park	Kotawaringin Barat, Central Kalimantan	415,000
14.	Sebangau National Park	Pulang Pisau, Central Kalimantan	600,000
15.	Natural Lab. of PSF, CIMTROP	Pulau Pisau, Central Kalimantan	50,000
16.	Nyaru Menteng Research Arboretum	Palangka Raya, Central Kalimantan	65
17	Tumbang Nusa Research Station**	Pulang Pisau	5,000

Source: Bismark *et al.,* 2005; Rangkuti S., 2010; and other source.

3.1.3. Habitat conversion

Peat Swamp Forest (PSF) in Indonesia, with total of nearly 13 million ha, consists of productive, unproductive and or non-forested land areas located in production forest, conservation areas (NP and Nature reserve), protected areas and convertible forest areas. Some areas remained abandoned (temporarily manageless). Conversion of convertible forest areas to other uses is possible under the government regulation (PP) No. 10/2010 (*Tatacara perubahan peruntukan dan fungsi kawasan hutan*) and PP No 24/2010 (*Penggunaan kawasan hutan*). Other forest is also occasionally converted to other uses based on economic consideration. Some areas of PSF have been converted to Industrial Forest Plantation and palm oil plantation in Sumatra and Kalimantan. There is no exact figure of the total areas have been converted to other uses.

Figure 5. Ex-burn peat swamp forest and illegal logs captured in Sebangau National Park, 2005.

3.1.4. Illegal logging and forest fires

Other serious threat to ramin natural resources and its habitats are illegal logging and repeated forest fires. Illegal logging has occurred since early reformation era (1998) and still takes place until now in all types of forests. Various efforts have been conducted to combat this illegal logging but still giving insignificant results. Ramin illegal logging mostly carried out through artificial canals, which is mostly build for illegal timber transportation.

The establishment of artificial canal mostly caused overdrained which frequently ignite forest fires. This forest fire has also intensified the degradation of habitat and the lost of ramin timber potential.

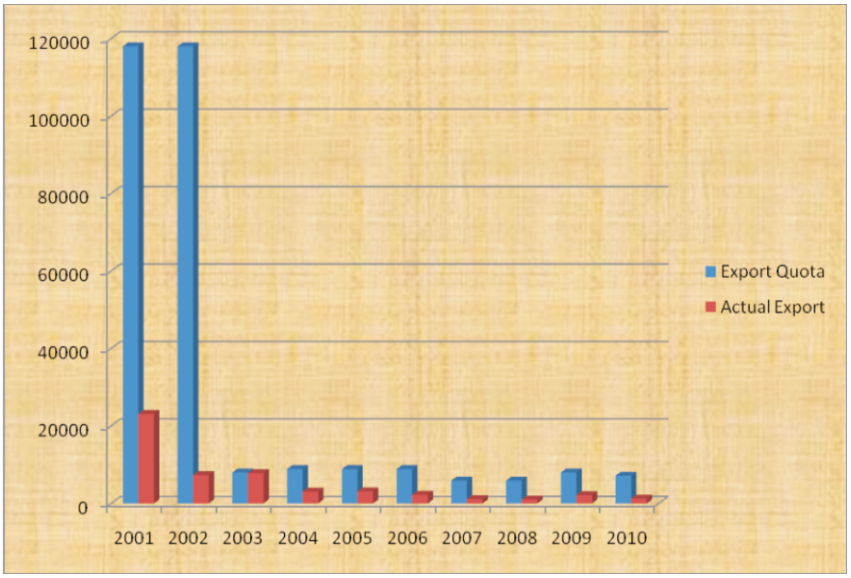

Figure 6. Export quota and actual export from 2001 through 2010 which indicates gradual reduction from time to time.

3.2. Restoration, Rehabilitation and Plantation

3.2.1. Restoration and rehabilitation

According to recent report, nearly over 67 million ha of Indonesian forest have been degraded. It also occurs in ramin habitat. There is no exact record on the degraded area of PSF. Ramin habitats could be classified into naturally intact forest, slightly degraded, heavily and severely degraded habitat. Logged over areas (LOA) are in slightly degraded until severely degraded.

The restoration and rehabilitation of ramin habitats must be carried out. There are some initiatives in restoration and rehabilitation of PSF. These activities face great barriers. This restoration of water level is prerequisite to the recovery of PSF, i.e through canal blocking. This canal blocking has been introduced by WWF project in Kalimantan and Wetland International in Sumatra and Kalimantan.

3.2.2. Plantation

Ramin population and habitats could be restored through enrichment planting and artificial plantation in production forest, conservation and protected areas. Enrichment planting is carried out under current silvicultural system. Small scale artificial plantation have been carried out in Sumatra and Kalimantan. Artificial plantations still faces great barrier due to limited planting materials (lack of seed sources and seed production). Seedlings for current plantation activities are relying on the existing limited supply of seeds, which is available only in an interval of 4-5 years. Other planting materials are from vegetative shoot cuttings.

Figure 7. Young ramin (*G. bancanus*) planted in South Sumatra.

3.3. Timber Harvest, Trade and Export

3.3.1. Timber harvest

There are several concession companies are currently operating in PSF other than concession companies for managing natural peat swamp forest. They are Industrial Forest Plantation (HTI) and Palm Oil Plantation for rubber and palm oil production.

Ramin timber is currently produced by PT. DRT in Riau operating in the concession area of 90,956 ha (Mujijat and Hermansyah, 2005). The annual harvest quota (AAC) for ramin is nearly 14.000 m^3 which is projected from the annual coupe (Figure 6). The export quota is determined by CITES-MA based on the recommendation made by CITES-SA and mostly nearly a half from the AAC. However, the actual export is always far below the export quota (Figure 6).

Demand for ramin timber remains relatively high. Even though, there is no exact figure for domestic consumption. The annual export quota which is determined by CITES -Management Authority (DG PHKA)) is approximately 8,000 cubic meters per year since 2002, compared to earlier year in 2001 (Figure 6). The products of ramin are generally used for light construction, baby crip, picture frame, dowels and other semi-finished products.

3.3.2. Trade and export

Ramin trade is regulated at least under three regulation, such as (1) as wild flora and fauna (Tumbuhan and Satwa liar-TSL) which is regulated under Minister of Forestry Regulation No. 447/Kpts-II/2003, (2) under Appendix II of CITES and (3) endorsement by Forest Industry Revitalization Board (BRIK) for export. Under TSL, the harvest, trade and transportation is carried out by registered company for both domestic use and export. The export of ramin also requires CITES compliance, such as permit and NDF assessment. The export of ramin product also requires endorsement from BRIK. The export destinations of Indonesian ramin are Asian and European countries.

3.4. Public Participation and Supports

3.4.1. Domestic support and intiatives

Ramin is still less popular for common public participation. The habitat is in PSF which is generally poor in accessibility, mostly slow growing and scarcity of

planting materials. Goverment intervention is required to enhance public participation. Private companies are unlikely to establish commercial plantation of *Gonystylus* due to economic consideration, unless forcely required and or by the provision of incentive mechanism. The provision of incentive mechanism, awareness raising and public compaign could enhance public participation.

Currently, very limited institutions have taken initiatives to conserve ramin and to restore its habitats. Those are research institutions, Provincial-District forest services, government owned companies, universities and local NGO. A newly established restoration non-government organization "PT. Restorasi Ekosistem Indonesia (REKI)", WWF Kalimantan project and Wetland International are among limited number of NGO who have initiated the restoration and rehabilitation activities in PSF, regardless the presence of ramin.

3.4.2. Regional and international

Both regional and international organizations have provided support for sustainable management and conservation of ramin and its habitats. Tri National Task Forces on trade on ramin is one of the initiatives to combat illegal logging and illegal trade in ASEAN countries. EIA and TELAPAK, is as a Non-Government Organization for monitoring illegal logging and trafficking of ramin timber. Recently, International Tropical Timber Organization (ITTO) and European countries through ITTO-CITES project provides support to ensure the SFM, conservation and trade of ramin. Other organization and countries may have given direct and indirect support for ramin conservation and sustainable management.

3.5. Policies, Regulation and Institutional Capacity

3.5.1. Policies and regulation on ramin

Current policies on ramin are logging moratorium, except a company with SFM certificate, the inclusion of ramin into CITES Appendix III and Appendix II and the export only finished or half-finished products. Logging moratorium and the inclusion into CITES Appendix are intended to reduce the pressure for excessive logging and illegal trade. The harvest is using selective cutting, but monitoring and supervision are still poorly conducted.

Other policy currently applied is related to the conversion of PSF where ramin is growing. Under existing regulation, this conversion is possible especially in pre-allocated convertible forest areas.

3.5.2. Institutional capacity

Several institutions directly and indirectly involve in ramin management and conservation are as briefly mentioned below. There are some implementation problems, such as coordination, overlapped duties, lack of financial allocation for supervision and monitoring etc.

DG of Forest Production Management

Responsible for issuing rules and regulation, monitoring and supervising. This includes the setting of annual allowable harvest (harvest quota) together with Provincial and District Forest Services.

DG of Forest Protection and Nature Conservation (CITES-MA)

Responsible for setting export quota for ramin and other CITES-listed timber species after receiving assessment (including NDF assessment) from CITES-Scientific Authority and field observatory team.

Indonesian Institute of Science (CITES-Scientific Authority)

Providing scientific judgement for setting quota together with other research institution, universities and NGO (local community representative) to CITES-MA.

Provincial and District Forest Services

Responsible for direct field monitoring and supervision to forest concession companies on the implementation of rules and regulations including providing annual reports, recommendation for AAC and other matters related to logging operation.

Research Institution

Conduct researches to support SFM and conservation. Result of national workshop on the identification of information gaps toward the SFM on ramin and PSF, indicate that scientific data and information regarding biology, ecology and population dynamics are still deficient. Research on logging impact, timber processing and many areas are still limited. In the future, these data and information need to be collected and regularly updated. Contraints on weak human resource capacity and funding supports need to be removed.

Table 4. Existing problems and barriers on ramin

Issues	Remarks
A. Resource Management and Conservation	
A.1. Production Forest 1. Poorly implemented forest management which caused unsustainable timber production including unclear allocation for ramin production forest. 2. Inappropriate and poorly implemented silvicultural system. 3. Continued decreasing and degrading ramin production forests, conservation and protection forests. 4. Lack/insufficient effort to restore ramin timber production, to rehabilitate its degraded habitats. 5. Deficient data on ramin natural resources. 6. Lack of information on biological, ecological and population dynamics of *Gonystylus* species.	Only *G. bancanus* which has been extensively explored its natural resource, biological and ecological information
A.2. Protection and Conservation Area 1. Weakly implemented the protection and conservation activities in each protection and conservation areas. 2. Still limited research activities to support management plan in protection and conservation areas in wider scope.	Funding is still insufficient to carry out consistent research activities.
B. Restoration, Rehabilitation and Plantation	
B.1. Restoration and Rehabilitation 1. Insufficient efforts to restore and rehabilitate the degraded habitats in production forest, conservation and protection forests. 2. Lack/insufficient policy and incentive mechanism to enhance restoration and rehabilitation of degraded areas. 3. Insufficient involvement of stakeholders in restoration, rehabilitation and plantation activities. 4. Lack of support in the expansion of existing initiatives in ecosystem restoration and rehabilitation.	Example of public participation in ecosystem restoration is Restorasi Ekosistem Indonesia (PT. REKI), the establishment of canal blocking by WWF and Wetland International

Table 4. (Continued)

Issues	Remarks
B.2. Plantation 1. Insufficient support to carry out plantation in degraded habitats. 2. Insufficient institutional and HR capacity in restoration, rehabilitation and plantation activities. 3. Insufficient planting materials and plantation technology to support wider plantation activities. 4. Insufficient public participation and private support in the plantation activities.	Ramin has not been promoted in National Movement for Land and Forest rehabilitation (GERHAN), primarily due to lack of planting materials
C. Timber Harvest, Processing, Trade and Export	
C.1. Timber Harvest and Processing 1. Decreasing ramin timber supply for domestic and for export. 2. Inefficient timber harvest and utilization including impact to the habitats and natural regeneration. 3. Insufficient research and development on logging activity, timber processing and trade. 4. Lack of promotion on the use of ramin substitution 5. Poor information on actual production, distribution and trade system. 6. Lack of updated information on potential standing stock.	Only one logging company currently harvests ramin, PT. DRT in Riau. Other companies operating in PSF with habitat of ramin are PT. Putra Duta Indah Wood (Jambi), PT. Sinar Mas group (Riau), PT. RAPP (Riau) and some companies operating in West and Central Kalimantan, Riau
C.2. Ramin Trade and Export 1. Lack of strategic and action plan for sustainable timber production, domestic and international trade. 2. Lack of monitoring, supervision and evaluation on timber production, transportation, trade and export.	Ramin export was executed by PT Uniseraya of Riau. More companies are applying the permit to export ramin

Table 4. (Continued)

Issues	Remarks
D. Public Participation and Supports	
D.1. National 1. Ramin is less attractive for public participation due to the presence of several barriers, such as lack of planting materials, slow growing and habitat characteristic of PSF. 2. Limited capacity for public participation in PSF, ramin habitat management and conservation. 3. Several universities and NGOs have started initiation in restoration and rehabilitation of degraded habitats, but still limited government supported to wider application	
D2. Regional and International Organizations 1. Limited support from regional and international compared to problems currently exist in ramin habitats. 2. Still lack of support to widely implement the findings resulted from existing initiatives and supports.	ITTO, CITES and other Non-Government Organizations have provided support. EIA (Telapak) has also supported in monitoring of illegal harvest and trade.
E. Policies, Regulation and Institutional Capacity	
E.1. Policies and Regulation 1. Lack of evaluation on the feasibility and the appropriateness of existing policies, rules and regulation. 2. Poor implementation, supervision and monitoring on the implementation of rules and regulation. 3. Weak law enforcement on many aspects of forest management and conservation.	Current rules, regulations: – Logging moratorium – CITES listings – Silvicultural system – PSF conversion to other uses – Rules related to logging restriction
E.2. Institutions 1. Weak capacity, awareness and coordination among relevant stakeholders in ramin management. 2. Unclearly defined strategic approach and action plans for sustainable management and conservation. 3. Poor capacity in monitoring, supervision and enforcement of law, rules and regulation. 4. Overlapped and unclear distinction of authorities in the implementation of task, responsibilities among stakeholders.	Central Government: MoF (DG BPK, DG PHKA, DG plantation and Social Forestry, BKSDA and Office of National Park). Local Governments: Provincial and District Services of Forestry, Agriculture and Estate Crop.

Source: Cited from various sources of reading materials.

IV. EXPECTED CONDITION, STRATEGY AND ACTION PLAN

In order to solve the existing problem and to achieve SFM and conservation of ramin, several strategic and action plan. To restore forest resource and management several programs which have been previously listed in MoF policy and program as follows: (1) Combating illegal logging and trade, (2) Rehabilitation and conservation of forest resources, (3) Revitalization of forest industry, (4) Empowerment of community economy and community surrounding forest areas and (5) Revitalization of forest areas.

Ramin, as part of the overall priority action by Ministry of Forestry, in this roadmap, is further elaborated for the five issues below: (a) resource management and conservation, (b) restoration, rehabilitation and plantation, (c) timber harvest, trade and export, (d) public participation and supports and (e) policy, regulation and involved institution capacity.

4.1. Resource Management and Conservation

4.1.1. Expected condition

It is expected that all economic and ecological value of ramin and ramin natural forests are fully restored. These could be achieved through the implementation of sustainable management and conservation, including sound silvicultural system and the effective implementation of rules and regulation, restoration and rehabilitation of degraded habitats, and logged over areas. Indicators of achievement are the recovery of population, natural regeneration, standing stocks and timber production. In normal condition for *G. bancanus* is the number of ramin mature trees ever recorded in PT. DRT and Kalimantan was at least 5 trees/ha or over 10 m^3/ha with normal age class distribution and abundant natural regeneration. In addition, the recorded degraded areas of ramin production forests gradually restored and rehabilitated with sufficient areas specifically allocated for ramin timber production as an integral part of PSF management. All species which are currently threatened by forest fires, illegal logging and encroachment are recovered and the ecosystem and economic functions of PSF are also restored.

4.1.2. Strategy

The strategy need to be taken are to improve the existing silvicultural system based on scientific information on forest condition, population dynamic, growth rate and yield. In addition, it is also necessary to identify the most suitable and feasible management system for PSF through the evaluation of existing management system which enables to provide sustainable timber stocking and harvest. Monitoring and supervision involving organizations and necessary support systems are also developed. The establishment and well managed sample plots for monitoring population dynamics and regular data collection for gowth and yield data including the existing capacity for naturally recovered are also necessary to be carried out. Regular monitoring for forest condition in conservation areas are necessary to ensure the achievement of conservation goal. The establishment of genepool and other *ex-situ* conservation for conserving the existing genetic diversity is also necessary. Findings from research and development activities are also required for setting management plan.

4.1.3. Action plan

1. *Improve ramin silvicultural system and its practices.*
2. *Continue collecting data for ramin population dynamics and growth data.*
3. *Develop acceptable ramin diameter limit for cutting to ensure sustainable harvest, population and habitats.*
4. *Improve supervision and monitoring capacity, especially during after logging operation.*
5. *Promote in-situ and ex-situ conservation in ramin production forest.*
6. *Continue conducting research and development to support SFM and conservation.*

Table 5. Stakeholders involved and expected roles

Stakeholders	Roles	Remark
1. Directorate General of Forest Production Management	– Promote and facilitate a review and evaluation on existing policy, rules and regaulation related to forest harvest, monitoring and supervision	
2. Directorate General of Forestry Planning	– Enhance the completion of landuse system allocated for ramin production forests and convertible areas	
3. Directorate General of Forest Protection and Nature Conservation	– Facilitate the R&D on the conservation areas for population, biolgical and ecological studies	
4. Directorate General of FORDA, Research Institution and Universities	– Conduct R&D activities on the existing forest resources, ecological and biolgical impact of harvest and other conservation. Involve in field data collection on the status of timber tree species in each area	Regional Research Center North Sumatra, South Sumatra and South Kalimantan
5. NGO and community	– Awareness raising and dissemination	
6. Provincial and district forest service	– Direct involve in field supervision and monitoring on the implementation of rules and regulation and the execution of field activities	Riau, Jambi, South Sumatra, West and Central Kalimantan

4.2. Restoration, Rehabilitation and Plantation

4.2.1. Expected condition

The exact figure of damaged and degraded areas of PSF is not precisely known. The damaged and the degraded areas distributes accross types of forest management, such as ramin production forest, conservation-protected areas and convertible areas. These damaged and degraded areas are expected to be recovered through various means, such as restoration of water level through canal blocking, rehabilitation using suitable species and ramin plantation. Population of ramin and other PSF species including their standing stock are also expected to be successfully restored.

This is also initiated with the great reduction in degradation rate and conversion rate of ramin habitat to other uses, either by human activities and other natural disturbance such forest fires.

In the restoration and rehabilitation activities, there are some existing initiatives and methods developed. WWF Kalimantan and Wetland International have developed canal blocking and rehabilitation of PSF in Sumatra and Kalimantan. Rehabilitation through plantation of some PSF species, such as *Shorea* spp, *Melaleuca*, Alstonia and *Diera* species have been carried out under the national movement of land and forest rehabilitation (GERHAN). The plantation of ramin which is constrained by the scarcity of planting materials. Mass flowering-fruiting of ramin which takes in every 5-6 years are not sufficient for consistent and continued plantation activities of ramin. The establishment of seed sources (seed production areas, seedling-clonal seed orchards and seed stands) which is currently not available,need to be carried out in order to provide continuous supply of ramin planting materials. The sources of planting materials for other species of *Gonystylus* are even unknown. Other species, such as *Shorea* spp., *Alstonia* spp., *Melaleuca* spp. and *Diera* spp. have no barrier in the provision of planting materials.

It is expected that all necessary pre-requisites for successful restoration, rehabilitation and plantation are available, such as clear boundary for ramin forest allocation, sufficient technology for restoration and rehabilitation including the support from regulation, the continues provision of planting materials and capacity. Relevant stakeholders and NGO who have carried out initial acivities in the restoration and rehabilitations are further facilitated. For *G. bancanus*, production of planting materials through vegetative shoot/stem propagation has been initiated and developed. However the production of larger quantity of propagated cuttings requires stockplants which need to be established.

4.2.2. Strategy

The possible approach to prevent further degradation is through the implementation of rules and regulation including law enforcement. To restore into the previous condition of the ecosystem is through consistent and continued restoration, rehabilitation and plantation activities. Relevant government authorities are expected to immediately determine the priority areas to be restored and rehabilitated. The search for alternative source of planting materials is still important other than the continued provision of planting materials through vegetative propagations which have been previously developed. The existing sources of seeds for other species are also expected to be further explored.

4.2.3. Action plan

1. *Continue developing technology for PSF restoration such as canal blocking to restore surface water level as prerequisite for successful plantation.*
2. *Enhance the identification priority areas for restoration and rehabilitation activities.*
3. *Continue providing high quality ramin planting materials.*
4. *Improve capacity in seedling propagation and plantation.*
5. *Improve capacity and awareness on the importance of restoration and rehabilitation of PSF and ramin.*
6. *Conduct various action research and development to support the restoration, rehabilitation and plantation of ramin.*

Table 6. Stakeholder involved and expected roles

Stakeholders	Roles	Remark
1. Directorate General of Forestry Planning	– Enhance the identification of priority areas and landuse system allocated for restoration, rehabilitation and plantation of ramin	
2. Directorate General of Forest Rehabilitation and Social Forestry	– Facilitate the initiatives on restoration, rehabilitation and plantation activities of ramin and other PSF species including the establishment of seed sources and procurement of planting materials	
3. DG FORDA, Research Institution and Universities	– Conduct R&D activities to support successful restoration of PSF ecosystem, rehabilitation and plantation	
4. NGO and community	– Awareness raising and dissemination of information, providing input to both concerned authority and community	Initiatives in ecosystem restoration have been introduced by PT. REKI in Sumatra and WWF and Wetland International

4.3. Timber Harvest, Trade and Export

4.3.1. Expected condition

It is expected that ramin timber production is restored, trade and export is clearly and accurately executed and recorded. This includes the improvement of logging and processing efficiency. Normal ramin timber from primary forest is approximately 4-13 harvestable trees per ha with the volume of over 10 m^3 per ha (Directorate of Forestry Planning (1983) as cited by Bismark *et al.,* 2005). The processing efficiency from log to valuable product (half –finished or finished product) is approximately 50% or less.

The recovery of ramin standing stock and production is also expected to improve ramin timber industry perfomance. Before 2001, ramin timber from Indonesia was booming and had given large contribution to national economy and providing large number of job opportunity. By increasing timber production, the trade in both domestic and international market is also improving.

4.3.2. Strategy

Several strategy are necessary for the restoration of timber production, processing efficiency and trade. The primary approach is to restore standing stock and potential timber production through the implementation of SFM. Later, the improvement of processing efficiency from harvesting stage to product finishing through the execution of applied research, the development of processing technology and capacity building. Trade and market system on ramin including pricing are also expected to be improved through trade and market research, trade monitoring and reporting.

4.3.3. Action plan

1. *Improve efficiency of logging activity through timber processing and market.*
2. *Conduct enrichment planting after logging to ensure the recovery of standing stocks.*
3. *Conduct trade and market research including the export-import mechanism and pricing.*
4. *Study on the link between export quota, growth rate, conservation factors and domestic.*
5. *Use improve linkage between Management Authority and Scientific Authority of producing and importing countries of ramin product.*

Table 7. Stakeholder involved and expected roles

Stakeholders	Roles	Remark
1. Directorate General of Forest Production Management	– Supervise, monitor the implementation of SFM, Trade and market	
2. Ministry of Trade	– Facilitate the information on trade and market	
3. Directorate General of FORDA, Research Institution and Universities	– Conduct R&D activities related to harvesting and processing efficiency, market system and pricing	
4. BRIK	– Enhance the implementation of product legality assurance (SVLK-Sistem verifikasi legalitas kayu)	Under current regulation, forest product export requires BRIK endorsement

4.4. Participation and Funding Support

4.4.1. Expected condition

Wide range of public participation and consistent funding supports are important for succesful management, restoration, rehabilitation and plantation activities. This is because plantation of slow growing ramin species is less attractive for commercial purpose. Ramin *G. bancanus* grows only in PSF which is mostly poor in accessibility. Government intervention is required in order to attract public participation, such as the provision of funding support, incentive mechanism, public compaign, awareness raising etc. It is expected that through the government intervention, public participation improves. The publics include government authorities, universities and NGO.

Example of public participation in the restoration and rehabilitation activites are canal blocking by WWF pilot projects and Wetland International and a model of ecosystem restoration of REKI. Other public participation in conserving plant species are conserving individual plant in botanical garden, arboretum, research station, educational forest and other types of forest. It is expected that these model participations will be further increased.

4.4.2. Strategy

A wide range of public participation in the restoration and rehabilitation of ecosystem and habitat in PSF and conservation of *Gonystylus* species are encouraged through awarness raising, capacity building and public compaign. Providing sufficient and consistent support to enable public participation not only for funding but also for field activities (direct field activities). The establishment of trust fund for long term restoration, rehabilitation activities and conservation is also searched for its possibility.

4.4.3. Action plan

1. *Provide sufficient and continuos support for the recovery of ecosystem, rehabilitation and conservation of Gonystylus species.*
2. *Facilitate the wide public participation in the management and conservation of Gonystylus species.*
3. *Search for international cooperation to support the activities, especially for R&D.*
4. *Build public partnership in restoration and rehabilitation activities.*

Table 8. Stakeholders involved and expected roles

Stakeholders	Roles	Remark
1. BAPPENAS/MoF	– Facilitate the long term funding support for restoration, rehabilitation of degraded ecosystem including PSF and ramin habitats	
2. Secretariat General of MoF	– Facilitate mechanism to consistently support Sustainable management and conservation, restoration of PSF ecosystem and ramin	
3. Concerned Authorities including Forestry Association and community	– Facilitate the long term supports, especially for restoration, rehabilitation and plantation of ramin, the possibility to establish trust fund for ramin conservation, rehabilitation and plantation	Center for Foreign Cooperation (Pusat KLN) plays important role on facilitating international funding support
4. NGO and community	– Continue their participation in public compaign and awareness raising toward the sustainable management, conservation and restoration	Several NGO have their own funding mechanism

4.5. Policy, Regulation and Institutional Capacity

4.5.1. Expected condition

Unsustainable management of ramin forest and degradation of habitats are associated with poor implementation of existing rules and regulation to implement at all levels of management. The expeced conditions are the improved rules and regulations which enable to support the achievement of sustainable management and conservation, the rules and regulations are also feasible to be field implemented by concerned stakeholders. All relevant stakeholders are well informed, then fully participate on the implementation of rules and regulation through dissemination, awareness raising and capacity building. Institutional and human resources capacity at all level of management are also expected to be improved based on their respective roles and responsibilities. Capacity for field monitoring and supervision is also improved. All the prerequisite conditions are expected to be in place in order to achieve the identified target.

Some of the rules and regulation required include the allocation of forest lands for ramin, as for timber production, conservation, restoration and rehabilitation activities. Others are silvicultural system used, incentive mechanism for sustainable management and conservation is readily applicable and acceptable by all parties, enforcement on field supervision and monitoring by responsible parties. CITES requirement and policy on logging moratorium also need to be reviewed. The role of provincial-district forest services, state owned companies, research institution and other relevant organizations that directly and indirectly support the management and conservation of PSF are also well defined and assigned. Forest managers, administrative and technical staffs including field staffs for field data collection are also expected to be fully trained and their capacity improved.

4.5.2. Strategy

Some existing rules and regulation related to harvest, restore habitat and species growing in PSF are weakly implemented including law enforcement in management and conservation of ramin. Human resource capacity in the execution of the rules and regulation are improved through regular training. Description of responsibilities among institutions is improved. Several approaches need to be taken, such as review and evaluation of the existing rules and regulation, field monitoring and supervision, the failure in the implementation, institutional and human resources capacity and the possible enforcement and provision of reward (incentive) mechanism. Training and awareness raising

including making national campaign need to be incorporated in the long term program. Regulation should enable to establish a trust fund for restoration, rehabilitation and plantation of ramin.

4.5.3. Action plan

1. *Improve rules and regulation related to harvest and restoration of PSF ecosystem.*
2. *Improve capacity for field supervision and monitoring.*
3. *Improve law enforcement to combat illegal logging, illegal trade and habitat encroachment.*
4. *Improve distinction of responsibilities among concerned institutions.*
5. *Enable the establishment of funding mechanism to ensure the continuity and consistency in achieving SFM and conservation.*

Table 9. Stakeholder involved and expected roles

Stakeholders	Roles	Remark
1. Directorate General of Forest Production Management	– Promote and facilitate the review and evaluation on existing policy, rules and regulation related to forest harvest, monitoring and supervision	
2. Directorate General of Forestry Planning	– Enhance the completion of landuse system allocated for ramin production forests and other use	
3. Secretariat General of Forestry, Legal Affair Division (Biro Hukum)	– Facilitate discussion and drafting the proposed review and evaluation on weakly implemented rules and regulation	
4. Research Institution, Universities and NGO	– Provide inputs, conducting R&D activities on the impact of the policies, awareness raising and dissemination	

V. MONITORING THE PROGRESS FOR UP TO 2025

5.1. Primary Stakeholders

This roadmap consists of strategy and action plans to achieve expected condition through the execution of activities separately or integrally by concerned stakeholders. Some activities are dependent on other activity in order to ideally achieve the subsequent stage. In practice, there is always situation that the ideal situation does not exist.

This roadmap is expected to be primary reference or guidance to achieve overall sustainable management and conservation of ramin and its habitats. To safeguard this roadmap, monitoring and evaluation on every action plan is required, whenever, this roadmap is used. There is no scientific basis to decide that this roadmap is designed from 2010 to 2025 with the interval of 5 years. Regardless this document is used formally or otherwise, it is expected that the content of this roadmap is used in the formulation of management plan by primary stakeholders below:

1. Directorate General of Forest Production Management, MoF.
2. Directorate General of Forest Protection and Nature Conservation, MoF (CITES-MA).
3. Directorate General of Land Rehabilitation and Social Forestry, MoF.
4. Indonesian Institute of Science (LIPI), CITES SA.
5. Provincial and District Forest Services.
6. State-Owned and Private Companies.
7. Research Institution and Universities.
8. Forestry Communities and NGO.

5.2. Phased Target and Indicator of Achievement

In order to achieve the objective of roadmap, a regular monitoring and evaluation need to be carried out through the observation of short term, medium term and long term target as phased approach.

Short term objective (2010-2015)

1. The use of roadmap as primary reference in setting development and action plan.
2. The execution of pre-requisite action plans which enable to execute the subsequent activities.
3. All relevant stakeholders are aware on the existence of this roadmap.
4. All necessary immediate activities are initiated.

Medium term objective (2016-2020)

1. The rate of degradation and population reduction reduces.
2. Large number of ramin planting materials are readily available.
3. Enrichment planting as part of logging activity is consistently carried out.
4. Restoration and rehabilitation activities are widely executed.

Long term objective (2021-2025)

1. Ramin forest resources are fully restored and sustainably managed.
2. Degraded habitats are completely rehabilitated.
3. Institutional and human resource capacity improved.
4. Ramin timber production and market are fully restored.

VI. CLOSING REMARK

Problems related to management and conservation of ramin in Indonesia have been identified and the most feasible solutions of the problems have been incorporated into this roadmap. The possible solutions have been identified based on the findings of ramin research and development, ramin ITTO project, workshops and intensive consultation and discussion with qualified parties, scientist, lecturers, practicioners at all level of management and NGO. The draft of this roadmap has been discussed in four small workshops and discussion meetings, in Bogor, involving the above parties. This roadmap may still contain some weak parts and or less accurately presented. Therefore, critical comments and inputs to this roadmap is still invited to continuesly improve its contents from time to time. The draft has been prepared as far as this draft could go within the available time frame and resource. Finally, it is expected that this roadmap could be used as primary reference to set out a programs and activities toward the achievement of sustainable management and conservation of ramin.

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