

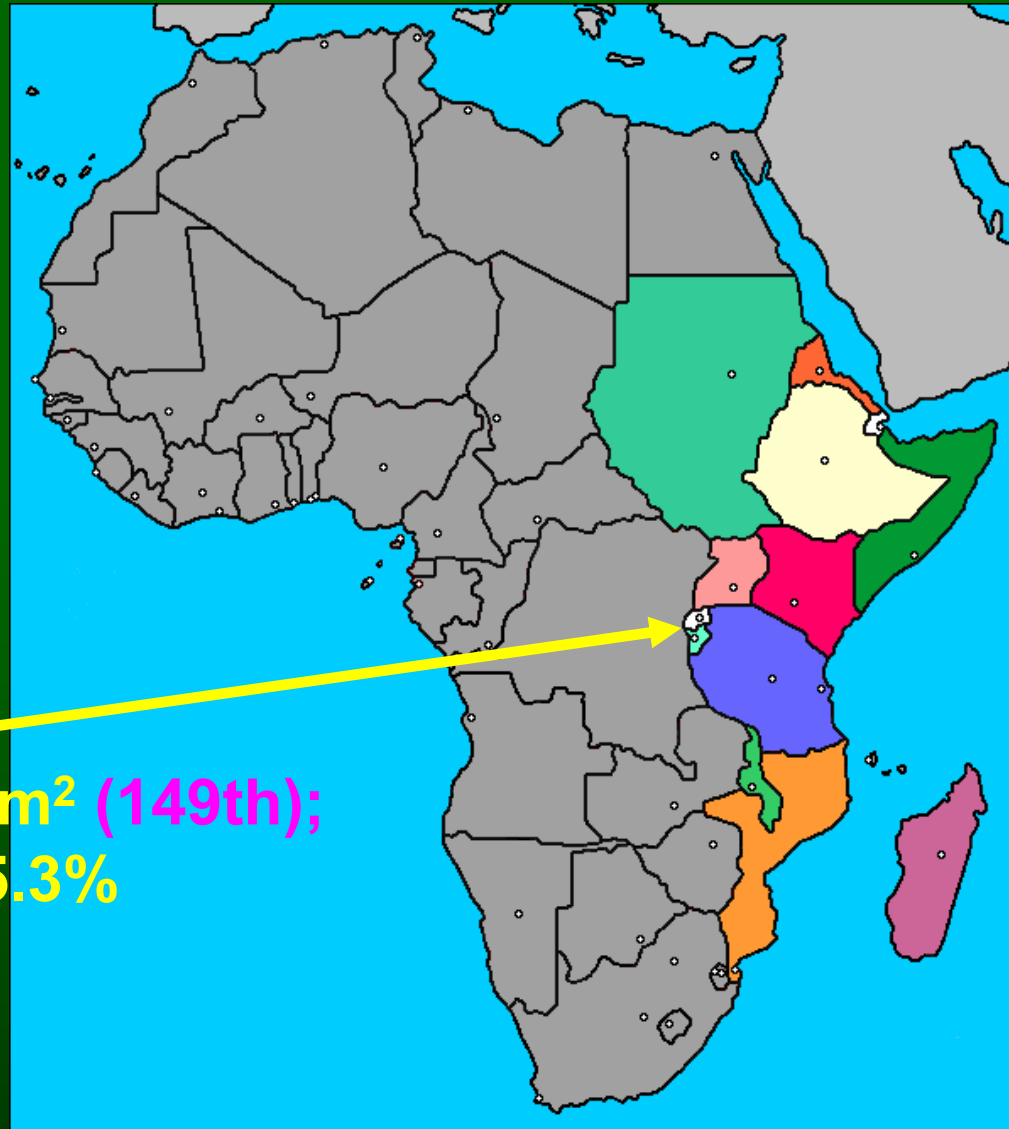
# **Silk Industry Development Initiatives in Rwanda**

## **Country Report**

**By**

**Pontiano Sebba Nemeye, Alfred Mutebwa  
and Sohn Woo Kee**

# GEOGRAPHICAL LOCATION OF RWANDA



**RWANDA**

**Area: 26,338 km<sup>2</sup> (149th);**

**Water: 5.3%**

# SOME FACTS ABOUT RWANDA

- (i) **Capital City and largest city:** Kigali (
- (ii) **Official language(s):** Kinyarwanda, French English
- (iii) **Government:** Unitary parliamentary
- (iv) **Government type:**  
Republic, Presidential, multiparty System
- (v) **Legislature:**  
Parliament: Upper house Senate  
Lower House Chamber of Deputies
- (vi) **Population:** July 2012 estimate 11,689,696 (73rd)  
2002 census: 8,162,715  
Density: 419.8 / km<sup>2</sup> (29th); 1,087.2/sq mi

- **GDP (PPP) 2011 estimate: Total \$13.684 billion**  
**Per capita: \$1,340**
- **GDP (nominal) 2011 estimate: Total \$6.179 billion; Per capita: \$605**
- **Age structure:**
  - **0-14 years: 42.9% (M/F 2,454,924 / 2,418,504)**
  - **15-64 years: 54.7% (M/F 3,097,956/3,123,910)**
  - **65 years and over: 2.4% (M/F 110,218/64,913)**
- **Population growth rate: 2.751% (2012 est.) 18<sup>th</sup>**
- **Urbanisation: 19% of total population VS 83% Korea**

# Some Historical Perspectives

- Considerable int'l attention: 1994 genocide
- Current Govt rehabilitated the economy
- Achieved stability and international integration
- Average income tripled over past 10 yrs
- Govt Rw one of most efficient and honest (Africa)
- Regarded safest country in East & Central Africa
- In 2008, Rwanda became first country in history to elect legislature with women majority

# Economic Highlights

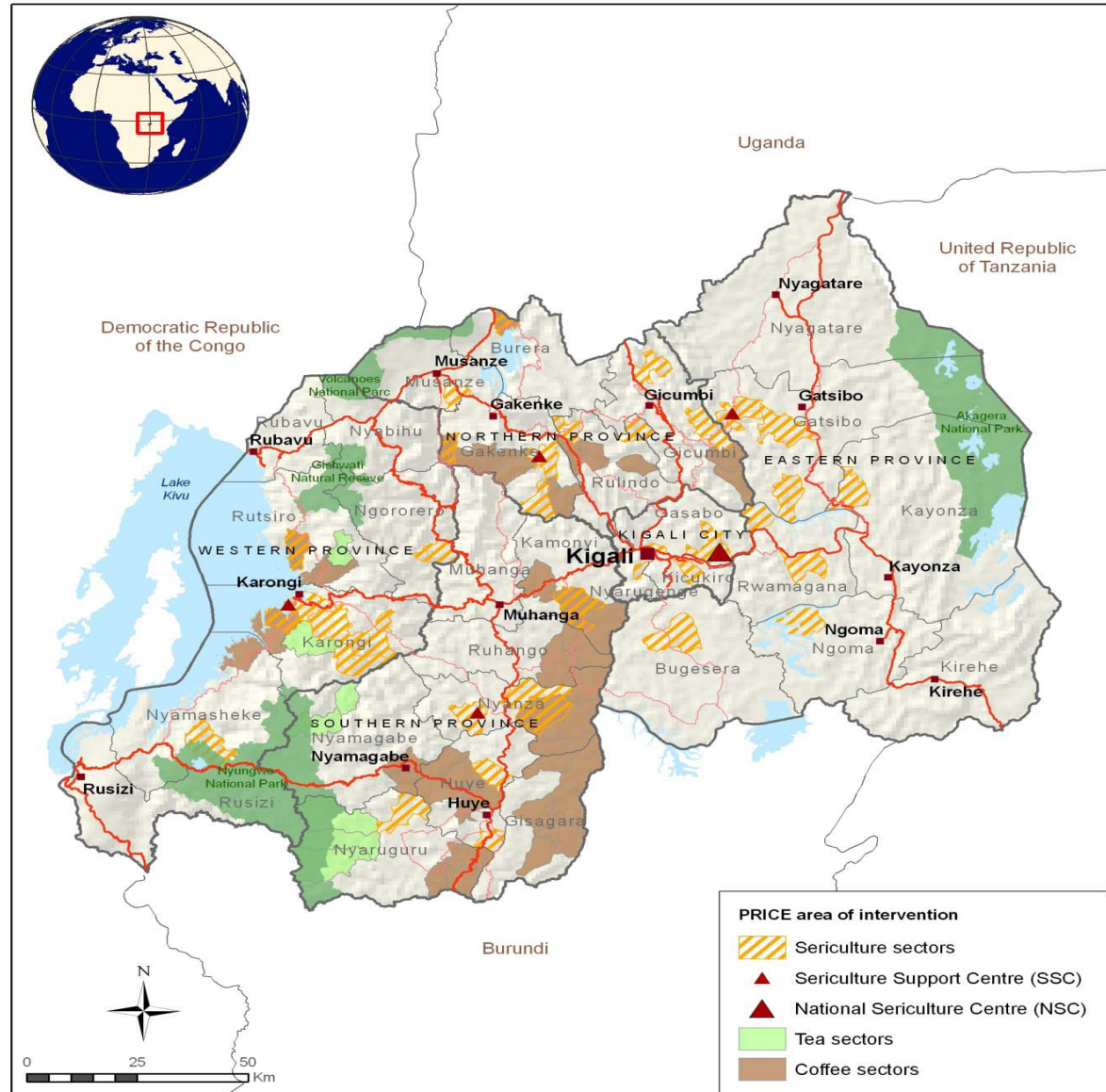
- **Agriculture backbone of Rwanda's economy accounting  $\approx$  46% of GDP / 80% of exports (MINAGRI, 2004). Korea: Agric. GDP contribn =2% (2012) from 27% in 1970.**
- **About 80% population traditional peasant-based subsistence farming for food and income generation. Korea: Agric. employs 7% from 50.4% in 1970.**
- **Few natural resources and limited industrial dev't**  
**Primary exports include coffee, tea and flowers**  
**with the addition of minerals in recent years - mainly**  
**Coltan used in manufacture of electronic and**  
**communication devices such as mobile phones**
- **Tourism is also a growing sector especially ecotourism**  
**in Nyungwe Forest and Lake Kivu plus gorilla tracking in**  
**Mgahinga volcano**

# **SILK INDUSTRY** **in Rwanda**

# Rwanda

## Project for Rural Income through Exports

Priority project sectors



23-6-2011



# History of Sericulture in Rwanda

- Earliest known record: ISAR, Rubona scientist trained at ICIPÉ in 2000
  - **ISAR staff sent for training: ICIPÉ and overseas**
  - 2004 - 2006 ISAR Project proposals : **No funding**
- Active Government interventions 2004 - 2006
  - Consultants hired by MINAGRI for feasibility studies:
    - **Rwanda conducive for silk industry**
    - Set up 4 Provincial Centres
- MINAGRI continued to support sericulture through different partners: PDCRE, RHODA, MINADEF, **UTEXRWA**, Coop's etc  
**NOW: NATIONAL SERICULTURE CENTRE (NSC)**
- **Support: GoR & Dev't Partners**
  - **IFAD (PRICE) : 5 years (2011 – 2015)**
  - **KOREA – IIRD/KNU: 19 months (Dec 2010 – May, 2013)**

# Strengths for Sericulture Development in Rwanda

- Hilly landscape ‘ **thousand hills**’ **altitude modified climate**
  - moderate temperatures (22– 28<sup>0</sup>C) ideal for **mulberry** and **silkworm**; **REARING ALL YEAR**
- abundant cheap labour
  - labour increasingly a problem India / China as they become industrialized**
  - strong interests by farmers**
    - high response in planting mulberry and rearing silkworm.**
- strong support by Government & Dev’t partners (MINAGRI / IFAD **++++**/ KOREA **+** / China**+**)
- ISAR research interests (Sericulture Unit)
  - staff training, rearing facility, 5 acres of mulberry**

- Potential Domestic Market: **Ladies traditional costume 'umushanana' imade from imported silk**
- Potential dev't silk cottage industries: local reelers / weavers benefit from silk industry: produce **silk handcrafts - souvenirs etc (local artisans)**



**MILLION SMILES**



- High quality Rwandan Silk: Tested 4A at CSRTI, India
- Silk exports will increase foreign exchange earnings

Internationally good  
for beginners

केंद्रीय रेशम उत्पादन अनुसंधान एवं प्रशिक्षण संस्थान  
CENTRAL SERICULTURAL RESEARCH AND TRAINING INSTITUTE

केंद्रीय रेशम बोर्ड  
भारत सरकार  
Central Silk Board  
Govt. Of India



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मैसूर - 570 008  
Srirampura, Manandavadi Road,  
Mysore - 570 008

सं.के.रे.बो. / अ.प्र.सं.  
No. CSB/RTI

दिनांक :  
Date :

CERTIFICATE FOR RAW SILK  
CLASSIFICATION AND CONDITIONED WEIGHT

Date : 09.02.2007

Applicant	:	Minagri Karongi
Description of Silk	:	Raw Silk
Number of Packages	:	3
Grade	:	4A
Size	:	20/22
Size Deriation	:	1.25 /Denier
Evinness change	:	10.00/stripes
Cleanness	:	95.00% percentage
Neatness	:	95.00%percentage
Maximum size deviation	:	2.6 denier
Denier	:	19/21
Winding break	:	7
Tenacity	:	3.76 gram/denier
Elongation	:	21.0%
Cohesion	:	120
Appearance	:	Fair
Colour degree	:	Medium
Luster degree	:	Medium
Hand degree	:	Ordinary
Average Moisture Regain	:	11.60
Grand weight	:	600.000
Net weight	:	550.000
Condition weight	:	575.000
Major defect	:	3
Minor defect	:	7
Total	:	3 + 7 = 10.

  
DIRECTOR  
C.S.R. & T.I.  
SRIRAMPURA,  
MYSORE-570008.

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यदि आप अपना पत्र हिन्दी में लिखेंगे, तो उतना ही शीघ्र जवाब मिलेगा जितना कि अंग्रेजी में लिखने से मिलता है ।

# Opportunities

- High-value, low volume property of silk:  
**ideal export commodity for land locked Rwanda**
- Employment for excess labour force in rural areas  
**women, youth and the elderly**
- Transfer of income from the rich to the poor  
**costly silk products purchased mainly by the rich:  
creating prosperity across the population**
- Minimum use of chemical pesticides if any:  
**opportunity for organic farming  
and environmental protection**

# Risks

- Lack of experience / expertise / **Investors** **in sericulture and silk processing**
- No management experience **in structuring / building a new industry**
- Possible new competitors / countries into industry **(Vietnam, Thailand, Bangladesh, etc.)**

# Risk Mitigation Strategy

- Initial hiring of reputable consultants inevitable to address **capacity building and managerial skills**
- Trade in silk and silk products:
  - no quota restrictions unlike **coffee**
  - take adv. **AGOA** and **Europe** trade agreements
  - **DEMAND TODATE MORE THAN SUPPLY**
- Develop vibrant **Research Capacity** in the country:  
**enhance production high quality silk competitive on international markets**
- **PROMOTION SHOWS: domestic/regional/int'l**  
**Conferences, exhibitions, trade shows, media channels, printed and electronic materials etc**  
**(e.g. Investor motivation pamphlets available)**

# Gender issues

- women: **bulk of labour force** in rural communities Rwanda
  - sericulture targets rural communities where **women are the majority**
  - sericulture offers tremendous potential for **employment** for **rural women** and the **unemployed youth** (girls / boys)
-



# Environment Issues

- Mulberry cultivation improves:
  - on-farm biodiversity**
  - soil conservation**
  - soil erosion control on sloped landscapes**
- Waste from silkworm rearing:
  - recycled as manure inputs to the garden**
- Dried mulberry twigs and branches: firewood
  - reduce the pressure on vegetation / forest**
- Mulberry may be intercropped with **leguminous annuals** :
  - bush beans, soybeans, garden peas etc:**
  - (IMPROVE SOIL FERTILITY, maximize returns / unit area)**
- Silk produced with **few chemical fertilizers** and practically **no insecticides**
- Silk: proteins similar to those in human skin thus, **extremely comfortable to wear**

# Financial Model 3ha of Mulberry

## (10 boxes , 8 cycles a year)

	YEAR1	YEAR2	YEAR3	YEAR4	YEAR5
Expenditures	7,078,295	5,626,400	1,291,400	1,291,400	1,291,400
Revenues Fresh Cocoons	3,800,000	3,800,000	4,256,000	4,560,000	4,560,000
Revenues Dry Cocoons	3,300,000	3,300,000	3,696,000	3,960,000	3,960,000
Revenues Raw silk yarn	3,420,000	3,420,000	4,788,000	7,695,000	7,695,000
Net Profit (Fresh Cocoon)	-3,278,295	-1,826,400	2,964,600	3,268,600	3,268,600
Net Profit (Dry cocoon)	-3,778,295	-2,326,400	2,404,600	2,668,600	2,668,600
Net Profit Raw silk Yarn	-3,658,295	2,206,400	3,496,600	6,403,600	6,403,600

## COCOON SORTING / GRADING AND PRICING AT UTEXRWA (FRESH COCOONS)

<b>Grade 1: 500 cocoon / kg (2 gm / cocoon)</b>	<b>PRICE = FRW 1900 (US\$3.4)</b>
Good cocoons = 400	80%
Double cocoons = 50	10%
Defective cocoons = 50	10%
<b>Grade 2: 600 cocoons / Kg (1.7 gm / cocoon)</b>	<b>PRICE = FRW 1350 (US\$ 2.4)</b>
Good cocoons = 400	66.6%
Double cocoons = 100	16.7%
Defective cocoons = 100	16.7%
<b>Grade 3: 800 cocoons / kg (1.25g / cocoon)</b>	<b>PRICE = FRW 950 (US\$ 1.7)</b>
Good cocoons = 400	50%
Double cocoons = 200	25%
Defective cocoons = 200	25%

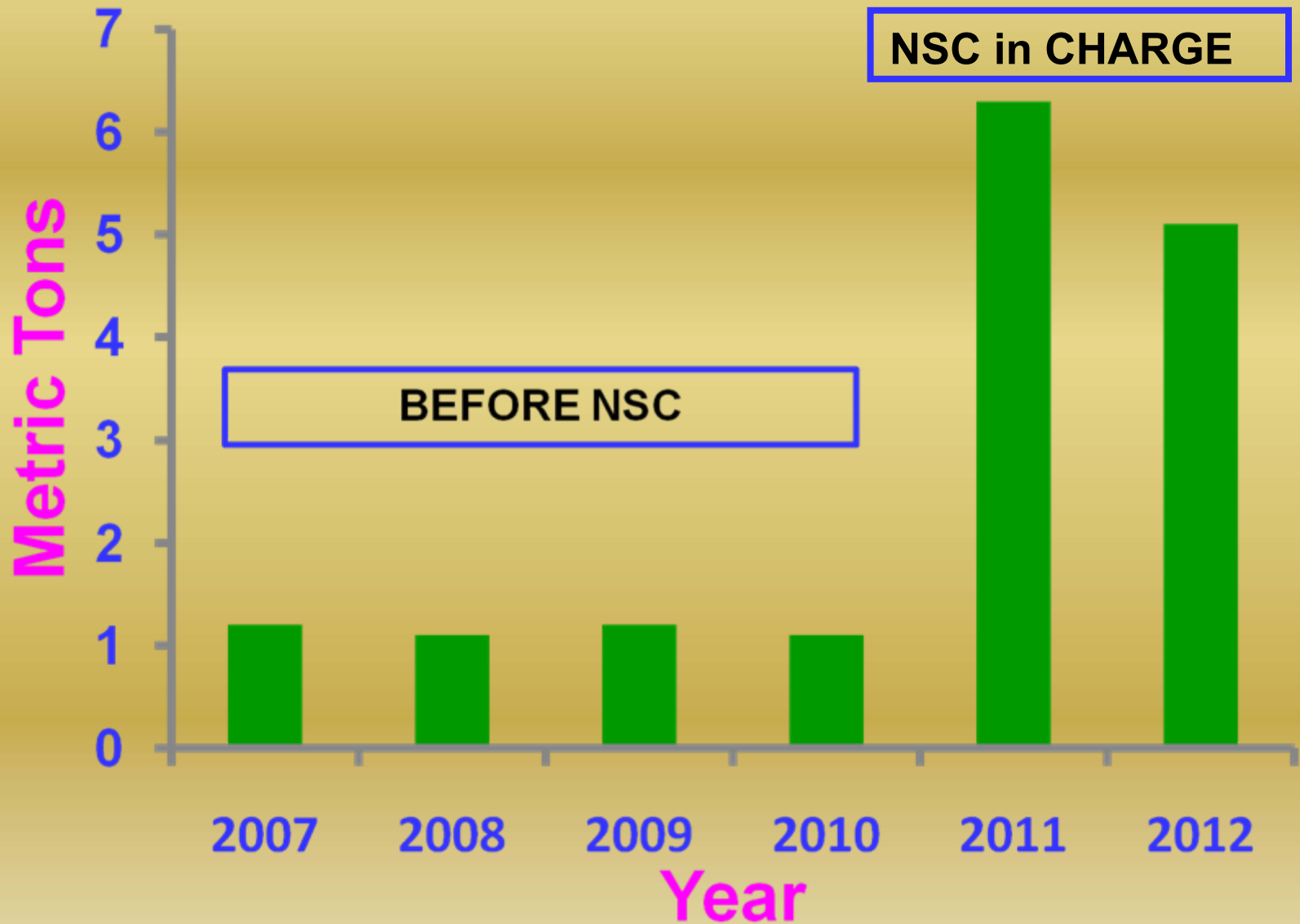
# CURRENT STATUS OF SERICULTURE IN COUNTRY

- SERICULTURE: nascent stage
- Limited Silkworm and mulberry germplasm accessions
- Only 3 promising combining pairs of silkworm races)
- Global shopping goes on : (Int'l friends / exchanges etc.)
- Farmers cocoon yield / box: >20 kg / up from < 20 kg
- Annual cocoon prod'n / year < 10 tons (fresh cocoons)



- **Sericulture farmers:**
  - ❖ **Infrastructure support (R/House/materials)**
  - ❖ **40 pilot cooperatives**
    - ❖ **Membership: 2236 (1199 F 1037M)**
  - **Area under mulberry: 350 ha**
  - **Area available for expansion: 650 ha**
  - **Potential cocoon production / year**
    - **350 ha: 262,500 kg of fresh**

# Cocoon production over the Years



# Potential cocoon and silk yarn production and associated revenues

M/berry (Ha)*	Leaf biomass (Kg)	No. of boxes per year	Fresh Cocoon (Kg)	Dried Cocoon (Kg)	Raw Silk Yarn (Kg)	Fresh Cocoon (USD)	Dried cocoon (USD)	Raw Silk Yarn (USD)
350	10,500,000	15,000	375,000	138,750	27,750	1,218,750	763,125	1,803,750
650	19,500,000	27,857	696,429	257,679	51,536	2,263,393	1,417,232	3,349,821
<b>TOTAL:</b>								
1,000	30,000,000	42,857	1,071,429	396,429	79,286	3,482,143	2,180,357	5,153,571

\* 350 ha planted; 650 of land available for expansion

- Fresh cocoons @ RWF 1,950 / USD 3.25 per Kg
- Dried Cocoons @ RWF 3,300 / USD 5.50 per Kg
- Raw silk yarn @ RWF 39,000 / USD 65.00 per Kg  
(Madagascar offers > USD 65 / Kg of raw silk)

# Ongoing Activities:

- **Capacity building**

- **TOT: Farmers, extensionists (>200)**
- **Overseas training / study tours**  
4 NSC staff benefited; more to go

- **Collaborations:**

- **RATDC – Chinese Centre ISAR Rubona**
- **Mwogo Valley Project Nyamagabe:**  
Poultry, Fish and Sericulture
- **KOICA: Expert deployed since Dec. 2012**

- **Awareness Campaigns:**

**Radio talk shows / TV programs; Extension Mg advisors provide regular interface with farmers, local authorities**



## Scheduled Activities Rest of 2013

- Support build **100 h'ses** for indiv. farmers
- Cocoon production ( $2*100*25*8$ ) = **40 tons/year**
- Transform Provincial Sericulture Centres (PSC) into Young Silkworm Rearing Centres (allows many cycles/yr)
- Import Chinese eggs for Farmers (> **200 boxes**)
- Procure **5 cocoon dryers**
- Establish **Cocoon buying Centre** by Province (Private Sector subsidy)
- Train **25 cooperative representatives**
  - Silk reeling technology
  - Silk weaving technology (Tender under prep'n)
  - **Comprehensive Silk Market Study:**  
Domestic / Regional Int'l (consultant)

- **Acquire Silk reeling Machine (automatic) tender**
  - **First Rwandan Silk Products penetrate Int'l mkt**
  - **Raw silk yarn & assorted handcrafts**
  - **Domestic Cocoon market solved**
- **Overseas training / study tours**
  - ≥ 5 NSC technicians for 30 days
  - ≥ 10 (farmers / union representatives)
- **Support formation of viable & credible silk unions and Silk federation (NSC / RCA)**
- **Produce Extension Reference Material**
  - **Kinyarwanda translations (1000)**
  - **English versions (500)**
- **Continue global lobbying for elite SW germplasm (ongoing)**

- **Initiate gradual transformation of Cooperative Based Cocoon Production model to Farmer Based Production model (IFAD Project: PRICE)**
  - Over 5 year period
  - 1,600 rural farmers to benefit
- **Expected cocoon production / year:**
  - $1,600 \times 3 \times 25 = 960,000$  Kg of cocoons

**NOTE:**

*The need to invest in post harvest cocoon processing machinery cannot be overemphasized*

## General Constraints

- Lack of good quality silkworm eggs
- No reliable entity to purchase cocoons
- Lack of sufficient **technical know-how**
- Lack of **efficient extension delivery system**
- Lack of **rearing houses / equipments**
- Cocoon transportation (buying centre far from farmers)
- Farmer skepticism in sericulture investments  
(**profitability not demonstrated yet**)
- No post harvest **cocoon processing facility**  
(to consume even low cocoon volumes)

# REVAMPING SILK INDUSTRY IN RWANDA

- **Substantial investments: two parallel models (Phased Approach)**
  - **Quality Silk Production for export: Grade I cocoons (80%)**
  - **Silk Cottage industry: Grade II (20%)**

## **1. Small Capacity Auto-Reeling Machine (\$ 100,000 accessories included)**

- **Grade 1 cocoons : Quality Raw Silk Yarn for Export (4A, 5A, 6A)**
- **PROVIDES READILY AVAILABLE COCOON MARKET**
- **Revolving Fund** required to buy farmers cocoons
- **Cocoon Buying Centres / province, (PRICE / GoR / Private)**

**2. Increase MB plant density: 8,333 / ha to > 15,000 ha:**  
paired row spacing (1.8 x 0.7 x 0.5): **massive campaigns**

**3. Increase mulberry acreages: 350 ha – 1,000 ha: massive campaigns**

**4. Introduce high yielding thick leafed mulberry varieties (Year 1 & 2)**

**5. Ensure regular advisory services / M&E**

## **YEAR III MB LEAF PRODUCTIVITY & COCOON PRODUCTION STABILISE**

### **7. Large Capacity Automatic / Semi-Automatic Reeling Machine**

**(\$ 270,000 / all accessories): Capacity: 34,000 Kg Raw Silk / year (2 shifts)**

- **272,000 Kg fresh cocoons,**
- **10,880 Silkworm boxes**
- **8,160,000 Kg mulberry leaves**
- **326 hectares of well maintained mulberry**
- **Cocoon Buying Centres upgraded (GoR / Private)**
- ***Out growers / contract farmers to produce cocoons for factory***

### **8. Investments in **weaving industry** to produce Quality Silk Garments**

**Electric weaving machines / Power looms**

### **9. Promotion of **Silk Cottage industries (Continuous Parallel Model)****

- **Use Grade II Cocoons**
- **Produce assorted handcrafts**

# CONCLUSION

- **Sericulture possible in Rwanda: conducive climate, soil, abundant rural labour, Govt / donor support**
- **Promotional phase need high initial capital investments by government and devt partners**
- **Acquisition of elite parent races (engine of silk industries)**
- **Processing machinery critical to take silk industry to another level: Domestic markets stimulate farmer / entrepreneurship involvement and production for export**
- **Value addition:**
  - **Silk processing machinery (silk yarn)**
  - **Promotion of Cottage Industries: handlooms**
    - **silk handcrafts: scarves, table/wall /door mats / hand woven fabrics – such as the traditional ladies attire *imishanana***

**THANK YOU**