

Community Oriented Integrated Ecosystem Approach for Conservation and Sustainable Management of Forest Genetic Resources:

Challenges in Biodiversity Conservation in Natural Tropical Forest – India

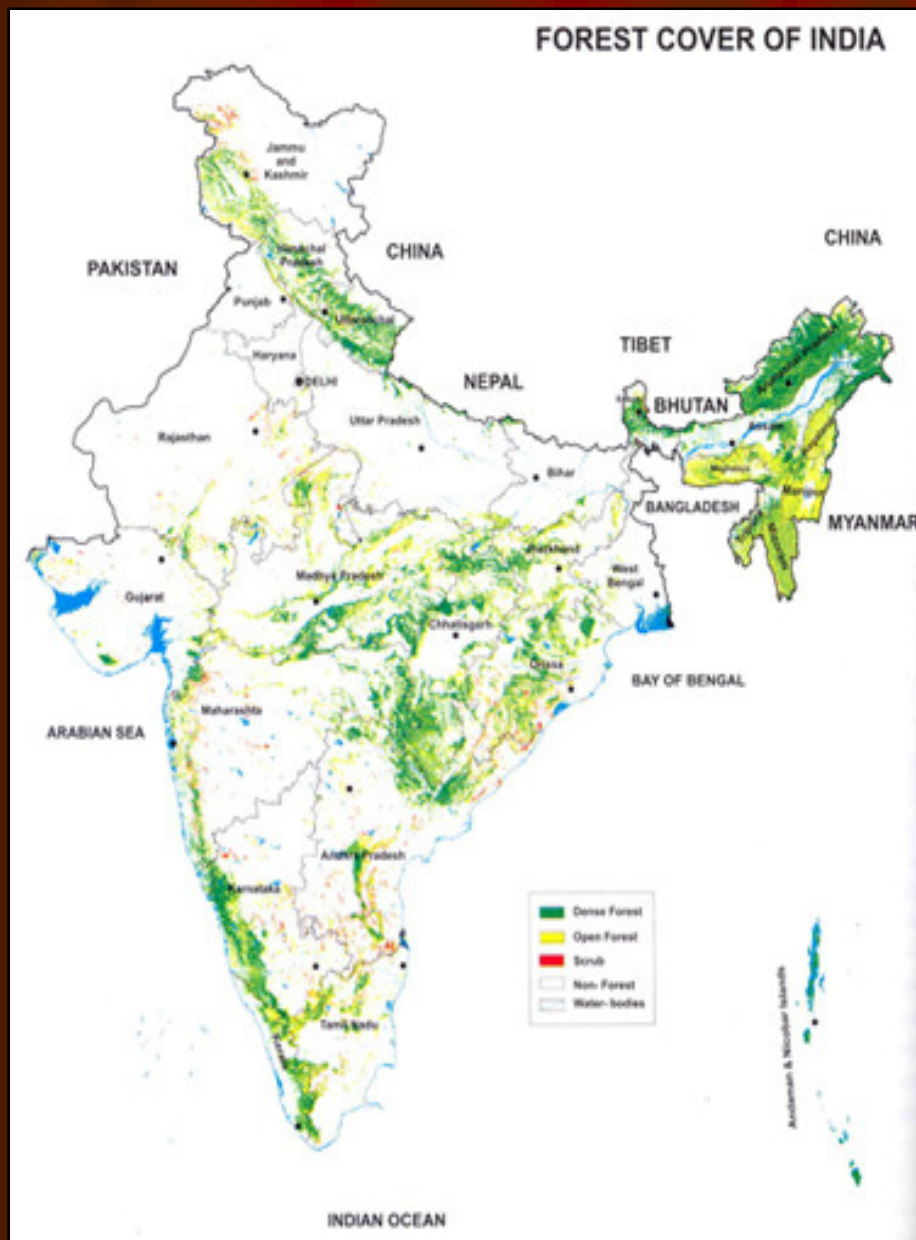


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India has a long history of conservation and management of biodiversity/medicinal & aromatic plants.



India is one of the 12 mega diversity countries

❖ **Wide range of physical and climatic conditions provide:**

➤ **Diverse ecological habitats**

➤ **Diverse Forest Types:**

▪ **Alpine Forests in Himalayas**

▪ **Dry and Moist Tropical Deciduous**

▪ **Wet Evergreen Forests**

▪ **Mangroves.**



Contribution of Forests: Ecosystem services supporting to:

- ✓ **7% of the worlds biodiversity**
- ✓ **16% of world population**
- ✓ **18% of cattle population**
- ✓ **2.5% of world's geographic area and about 2% of forest area**
- ✓ **7% of world's flora**
(328 families with 21,000 representative plant species)



Contribution of Forests: Ecosystem services supporting to

- ✓ **7.6% of world's mammals**
- ✓ **12.6% of world's bird species**
- ✓ **6.2% of world's reptile species**
- ✓ **4.4% of world's amphibians**
- ✓ **11.7% of world's fish species**
- ✓ **Several species endemic to India**

(Source: FSI, 2004)



Insights

- **Recorded forest area of the country: 23.38%**
- **Second largest land use after agriculture.**
- **Owner State Government.**
- **About 300 million poor people depend for livelihood.**
- **About 70% supply of raw material to Pharmaceutical industries.**



How forests support the "natural infrastructure"

Ecosystem Goods & services

ecological, economical, societal

Air quality

Pest & disease control

Watershed protection and regulation

Wild species & habitat protection

Plant pollination

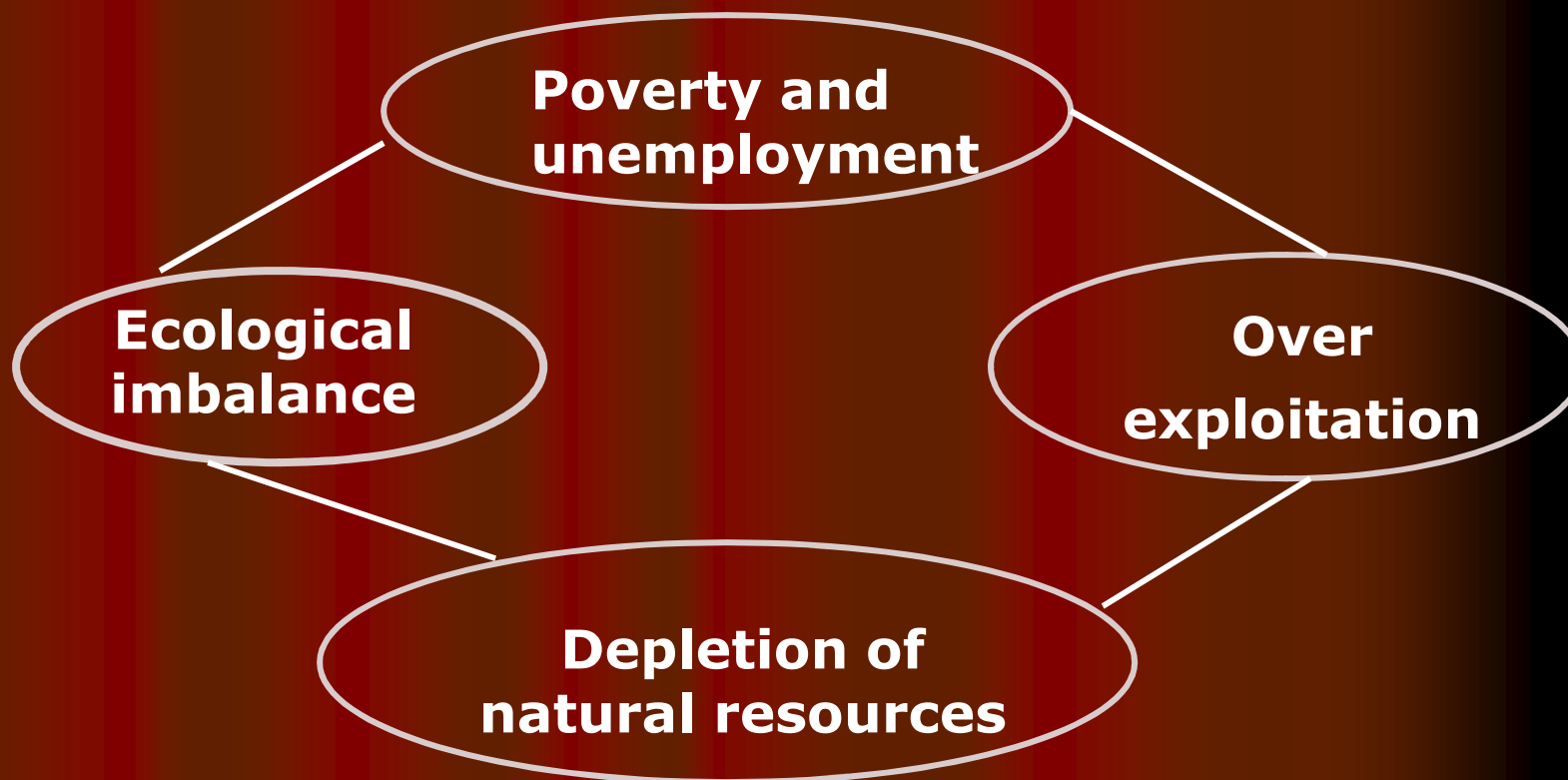
Carbon sequestration and storage

Soil formation and fertility

Decomposition of wastes

Landscape beauty

Vicious Spiral



Needs and Risks associated with increased dependency

Contribution of Native biodiversity

- ✓ **Major NTFPs for livelihood of dependent people**
- ✓ **500 m people rely for subsistence**
- ✓ **About 40% of total forest revenue**
- ✓ **55% of forest based employment**
- ✓ **Supply of raw materials from forests to Pharmaceutical industries**



Challenges for conservation

- Progressive degradation of forest
- About 40% categorized as degraded forests.
- Emerging challenges on regional biodiversity conservation & unsustainable management
 - ✓ Qualitative
 - ✓ Quantitative &
 - ✓ Functional



Over exploitation of resources

- ✓ Dependency for livelihood
- ✓ Ignorance of traditional practices for collection
- ✓ Over demand / trade



Unregulated biotic factors

- ✓ **Forest land diversion, grazing, fire etc.**

Habitat loss

- ✓ **Emergence of ecologically non congenial condition**

Invasion of alien species.

- ✓ **Direct impact on native FGR**

Impact of climate change

- ✓ **Threat to native FGR *in-situ***

Un-sustainable use not beneficial

"Neither in ecological
nor in social terms"



29.01.20



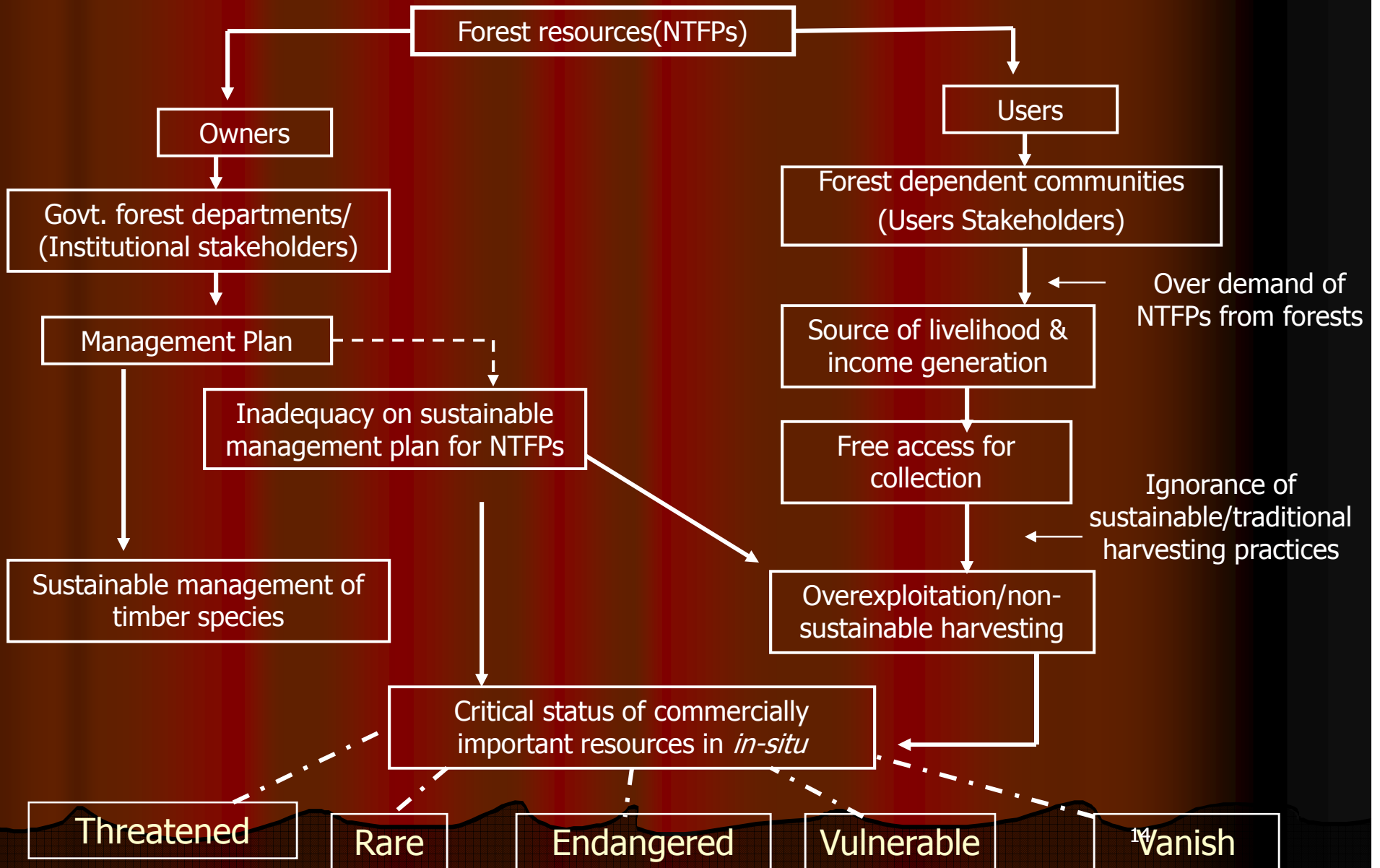
Phyllanthus emblica L.
"Aonla"



Aegle marmelos (L.) Correa
"Bel"



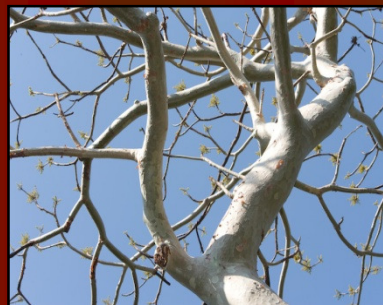
Impact on biodiversity



Emerging threats

Ecological Perspective:

- ✓ Destructive Harvesting of tubers, roots, leaves, fruits, flowers, bark, gum, resins and dyes by local dependent communities from natural forests.



Sterculia urens:
gum



Litsea glutinosa:
Bark



Buchanania lanzan :
Fruits



Chlorophytum tuberosum : Root



Emerging threats

Social Perspective:

- ✓ **Dependency of poor people for**
- ✓ **Sources for income and livelihood security**
- ✓ **Ignorance of traditional practices**
- ✓ **Lack of Knowledge of scientific input of harvesting and primary processing**

Economic Perspective:

- ✓ **Growing demand on herbal medicines**
- ✓ **Gap in demand and supply**
- ✓ **Decreasing trend of resources supply from forests**

Now the questions are :

- ✓ Threat on FGR committed to perpetuation/ sustainability *in-situ* ?
- ✓ The conditions of forest and its users acceptable?
- ✓ Prevailing management intervention adequate?
- ✓ Extinct wild genetic resources can be retrieved ?



No specific community based co-management system

- ✓ **About 60% production of the collected NTFPs is unrecorded due to inadequate management interventions.**
- ✓ **No authoritative information on resource availability (Threshold limit) and sustainable management in natural forests.**



Threat....

Lacunae in policy implementation:

- ✓ **Management intervention: unregulated, non sustainable, unscientific collection**
- ✓ **Right of free access of collection of NTFPs**
- ✓ **Species specific management plan for NTFPs**
- ✓ **Integrated co-management system**

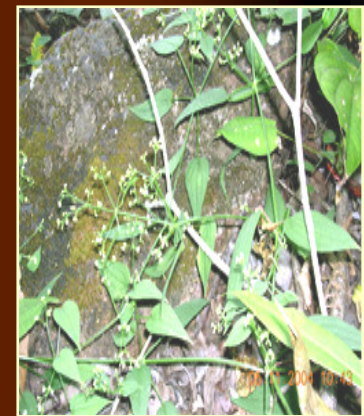


Need of strategic interventions for:

- ✓ Conservation and sustainable management of FGR in: Ecological, Social Economic and Policy terms.
- ✓ Collaborative integrated approach: institutional/users stakeholders.
- ✓ Regulated commercial exploitation, strict legal provisions to prevent destructive harvesting.



Curcuma caesia: (Kali haldi)
Use: Roots are used in Asthama



Rubia manjith Roxb. : (Manjitha)
Use: Roots are used in jaundice.



Need of strategic interventions for:.....

- ✓ **Strict implication of sustainable harvesting limit of NTFPs collected from natural forests.**
- ✓ **Economical viable, user friendly and socially accepted techniques**
- ✓ **Trainings and capacity building programme for dependent communities**



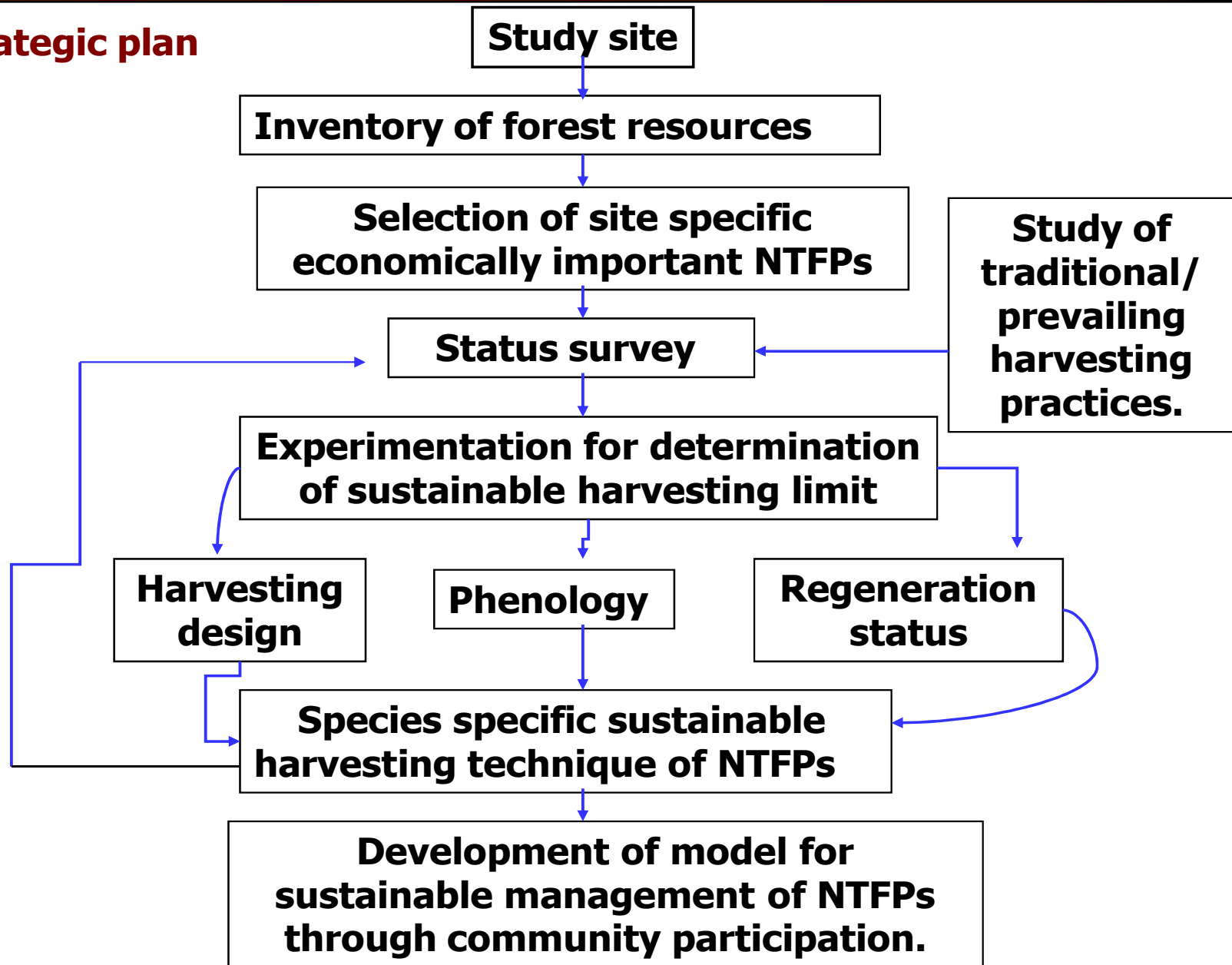
Contd...

- ✓ **Community oriented “Self Assessment Technique” for conservation of biodiversity.**
- ✓ **Creating massive people’s participation.**
- ✓ **Site specific models for enhancement of goods and services.**



Need of strategic planning for determination of sustainable harvesting limits of utilizable NTFPs with community participations

Strategic plan



Role of Institutional and users stakeholders

- ✓ Regular monitoring and evaluation with scientific inputs.
- ✓ Importance of natural forests in balancing ecological and economic benefits.
- ✓ Viable management partnership.



Innovation in limit determination of sustainable harvesting in natural forests with community participation : Case study

- ✓ Determination of sustainable harvesting technologies with dependent community participation.
- ✓ Identification and protection of potentially rich biodiversity areas *in-situ*.



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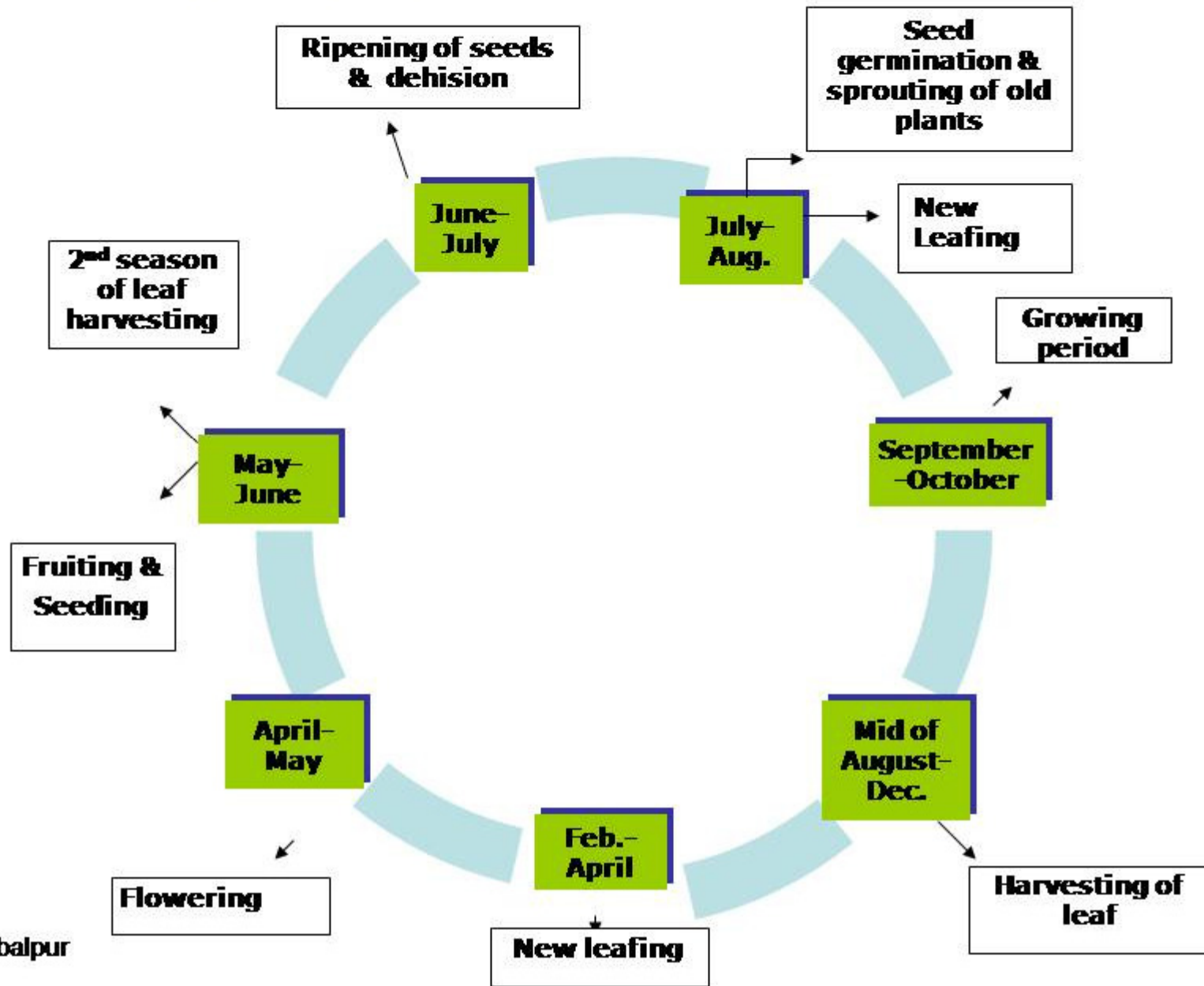


Innovation in determination of limit of sustainable.....

- ✓ **Resource Inventory to evaluate present status/ availability/threats (quantitative assessment).**
- ✓ **Sustainable harvesting regimes (species specific Regeneration potential) *in-situ* conditions.**

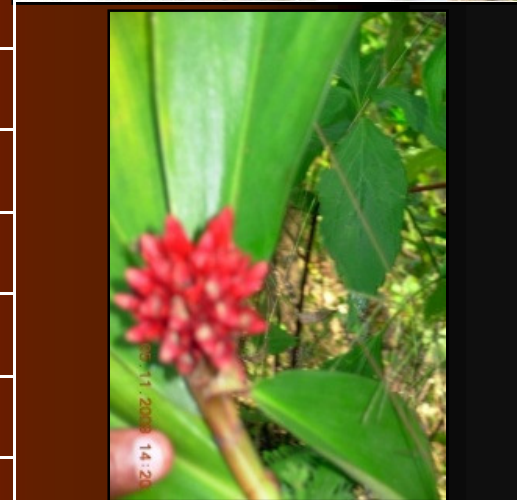


Phenological Diagram



Sustainable harvesting limits of some commercially important NTFPs with active community participation *(Pandey & Saini, 2008 and Pandey et al, 2011)*

S. No.	Name of Species	SHL (%)
1	<i>Chlorophytum tuberosum</i> (Safed Musli)	30%
2	<i>Curculigo orchioides</i> (Kali Musli)	68%
3	<i>Curcuma angustifolia</i> (Tikhur)	64%
4	<i>Dioscorea daemona</i> (Baichandi)	44%
5	<i>Plumbago zeylanica</i> (Chitrak)	64%
6	<i>Asparagus racemosus</i> (Satavar)	52%
7	<i>Bauhinia vahlii</i> (Mahul bela)	58%
8	<i>Embelia basaal</i> (Baibidang)	80%
9	<i>Costus speciosus</i> (Keokand)	58%
10	<i>Phyllanthus amara</i> (Bhui aonla)	71%
11	<i>Andrographis paniculata</i> (Kalmegh)	42%



Determination of sustainable harvesting limits.....

1. *Chlorophytum tuberosum* (Safed Musli)



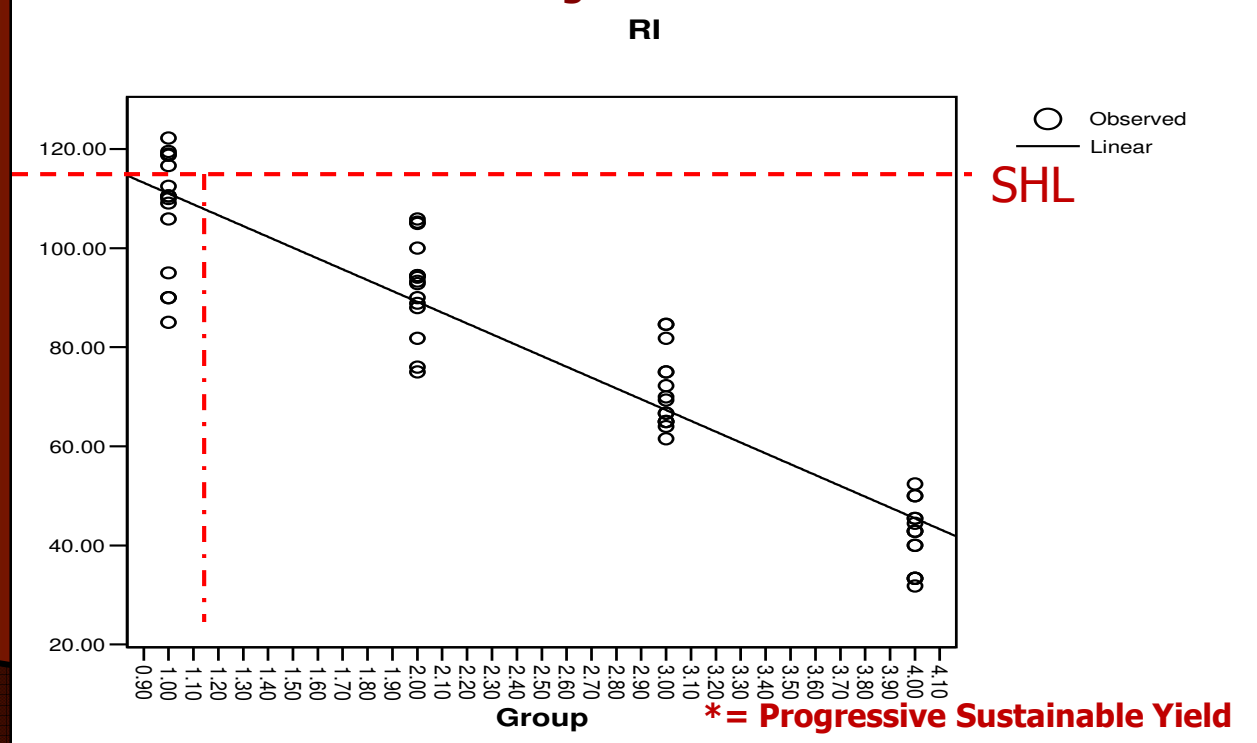
Index: harvesting treatments

- 1=20%;
- 2=40%;
- 3=60%;
- 4=80%

SHL= 30%

*(PSY= >30%)

Curve Fit model of Linear regression for determination of SHL



Determination of sustainable harvesting limits.....

2. *Curculigo orchioides* (Kali Musli)



Index:

1=20%;

2=40%;

3=60%;

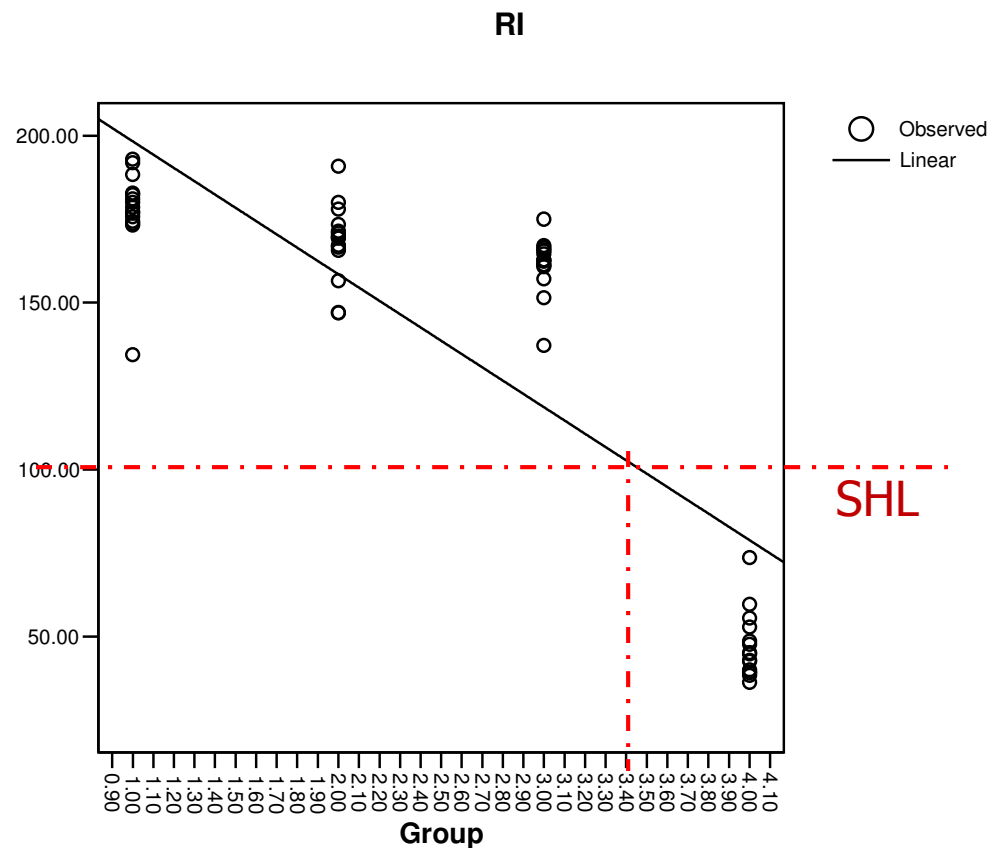
4=80% harvesting percentage

SHL= 68 %

*(PSY= >68%)

*= Progressive Sustainable Yield

Curve Fit model of Linear regression for determination of SHL

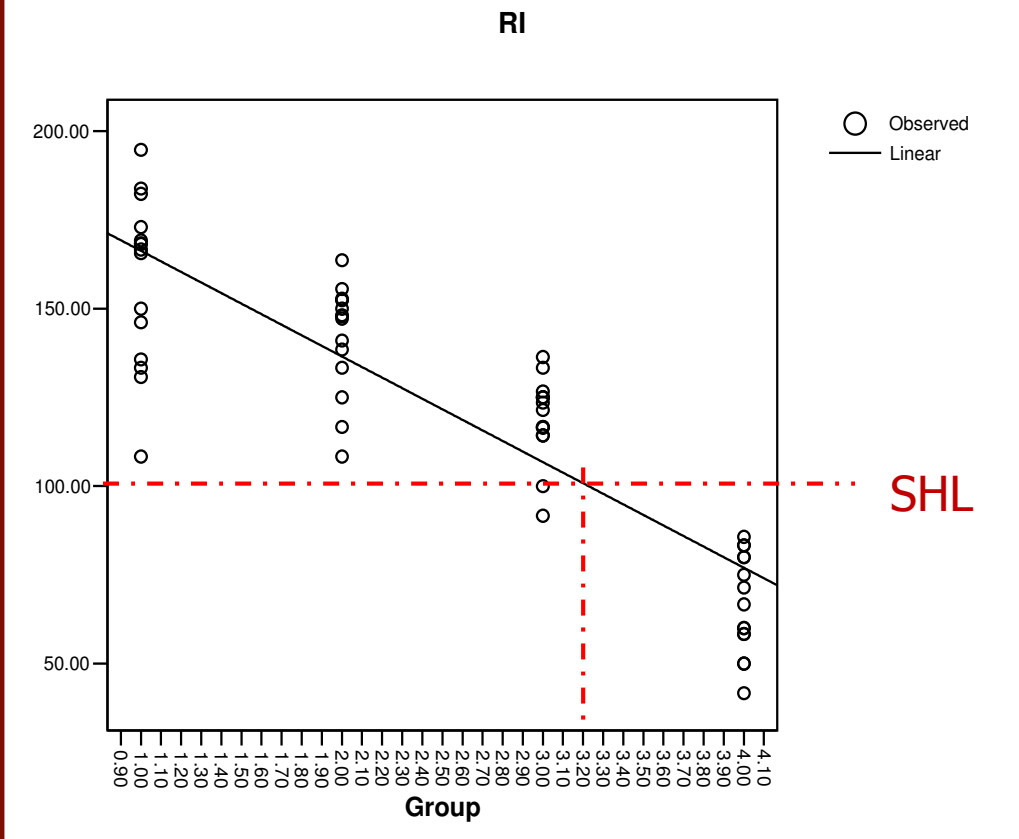


Contd.....

3. *Curcuma angustifolia* (Tikhur)



Curve Fit model of Linear regression for determination of SHL



Index: 1=20%; 40%; 3=60% and 4=80% harvesting treatment
SHL = 64% , *(PSY= >64%)

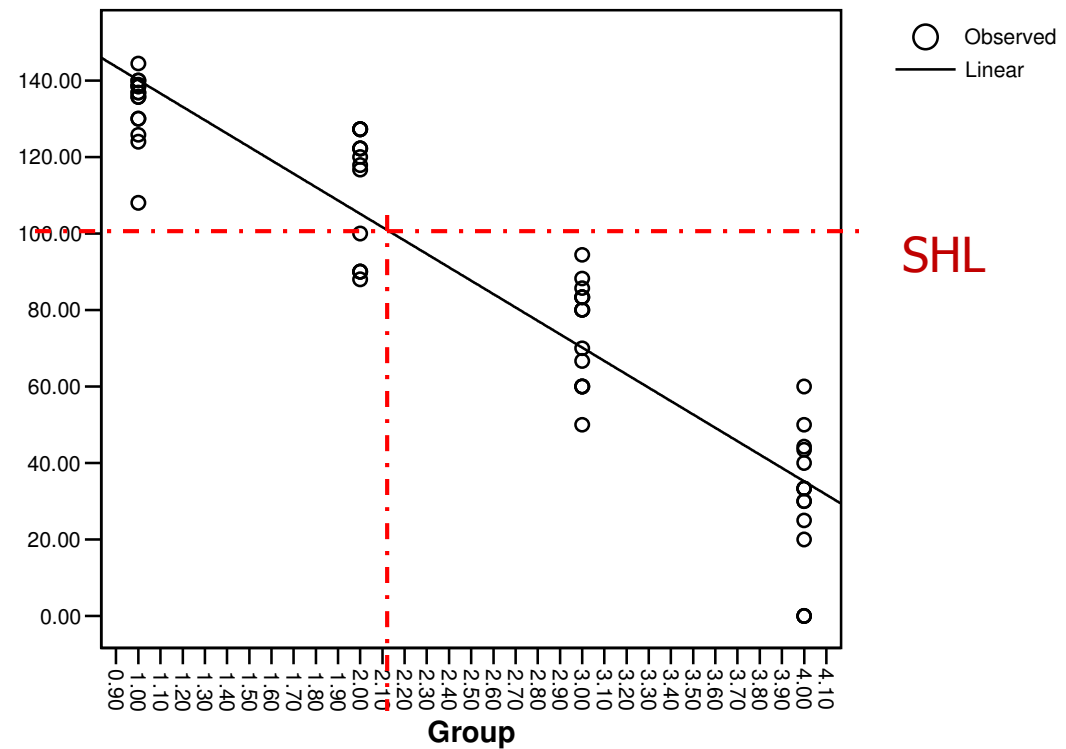
*** = Progressive Sustainable Yield**



4. *Dioscorea daemon* (Baichandi)



Curve Fit model of Linear regression for determination of SHL_{RI}



Index: 1: 20 %; 2:40%; 3: 60% and 4: 80% harvesting Groups
 SHL = 44% , *(PSY = >44%)

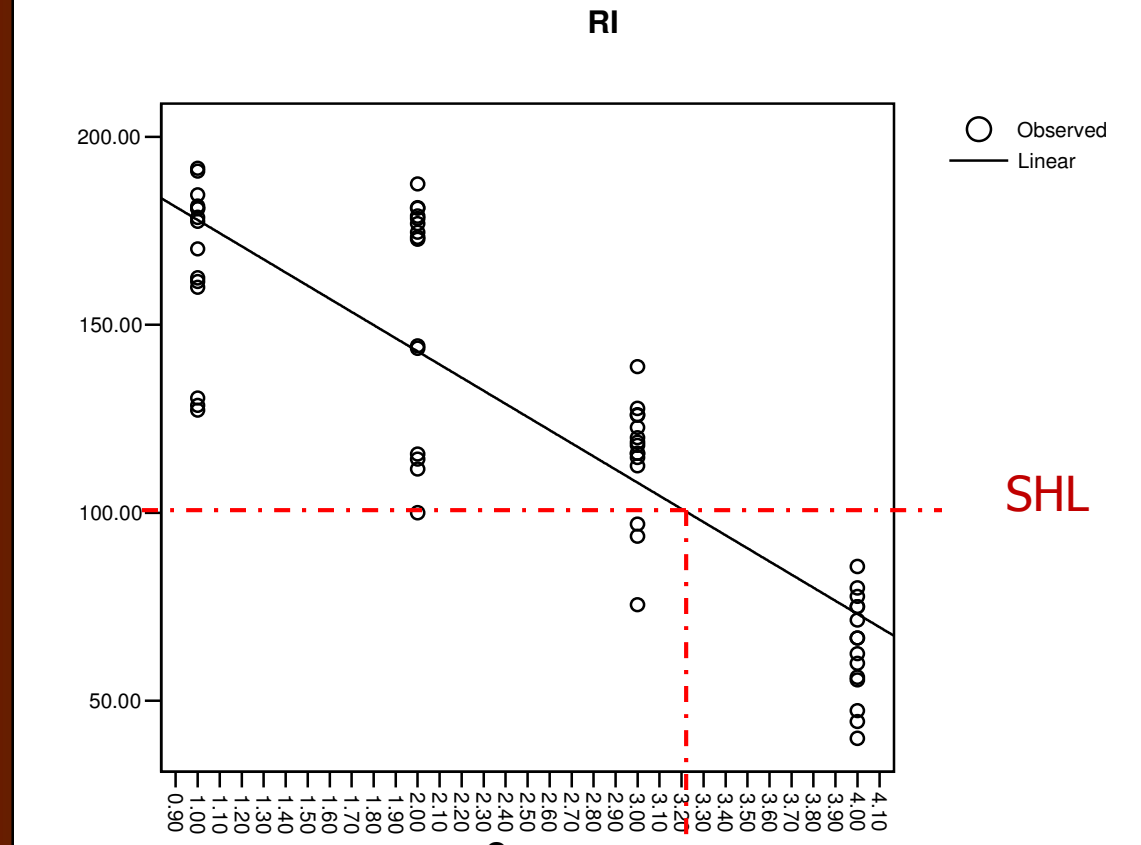
*= Progressive Sustainable Yield

Contd.....

5. *Plumbago zeylanica* (Chitrak)



Curve Fit model of Linear regression for determination of SHL

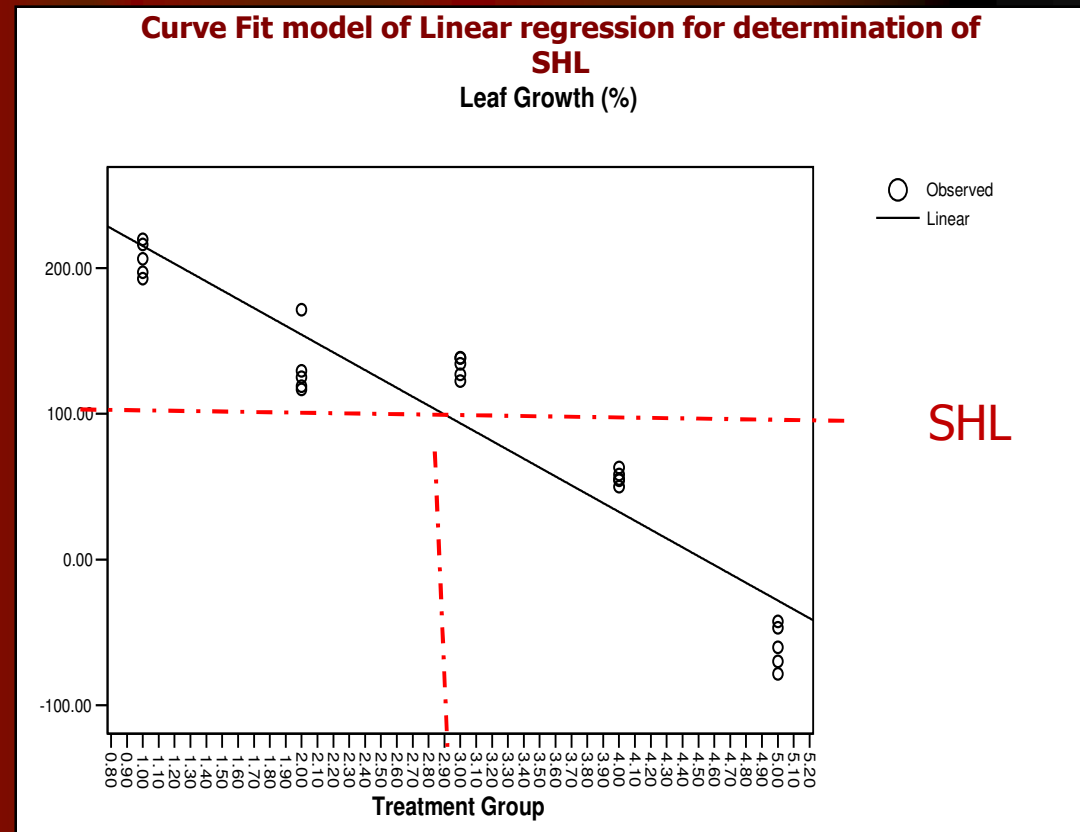


Index: 1=20%; 2=40%; 3=60% and 4=80% harvesting
SHL= 64%, *(PSY= >64%)

*= Progressive Sustainable Yield

Contd.....

6. *Bauhinia vahlii* (Mahul leaves)



Index: 1= 20 %, 2=40%, 3=60%, 4=80% and 5=100 % harvesting intensity.

SHL: 58% , *(PSY= >58%)

***= Progressive Sustainable Yield**

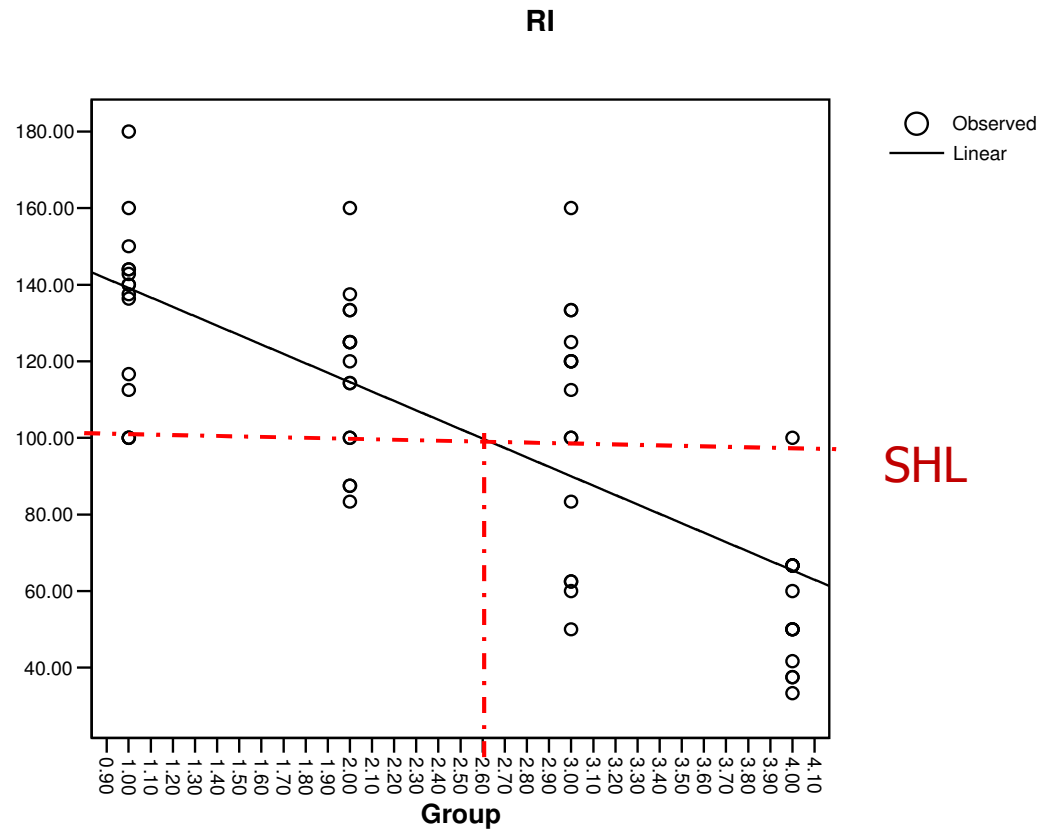


Contd.....

7. *Asparagus racemosus* (Satavar):



Curve fit Model for *Asparagus racemosus*.



Index: 1=20%, 2=40%, 3=60%, 4=80% harvesting Treatment
SHL= 52%, *(PSY= >52%)

***= Progressive Sustainable Yield**



Need of scientific inputs:

- ✓ **An innovative “Self-Assessment” method with community participation.**
- ✓ **Status: inventory, ecology, distribution, phenological observation**
- ✓ **Habitat requirements**
- ✓ **Regeneration/growth dynamics**
- ✓ **Yield-potential**
- ✓ **Assessment/monitoring of the consequences of commercial harvesting from forests.**
- ✓ **Encourage traditional practices for conservation and sustainable use**
- ✓ **Institutional role to analyze rules, regulations in favor of conservation and sustainable management of FGR**



Thanks

