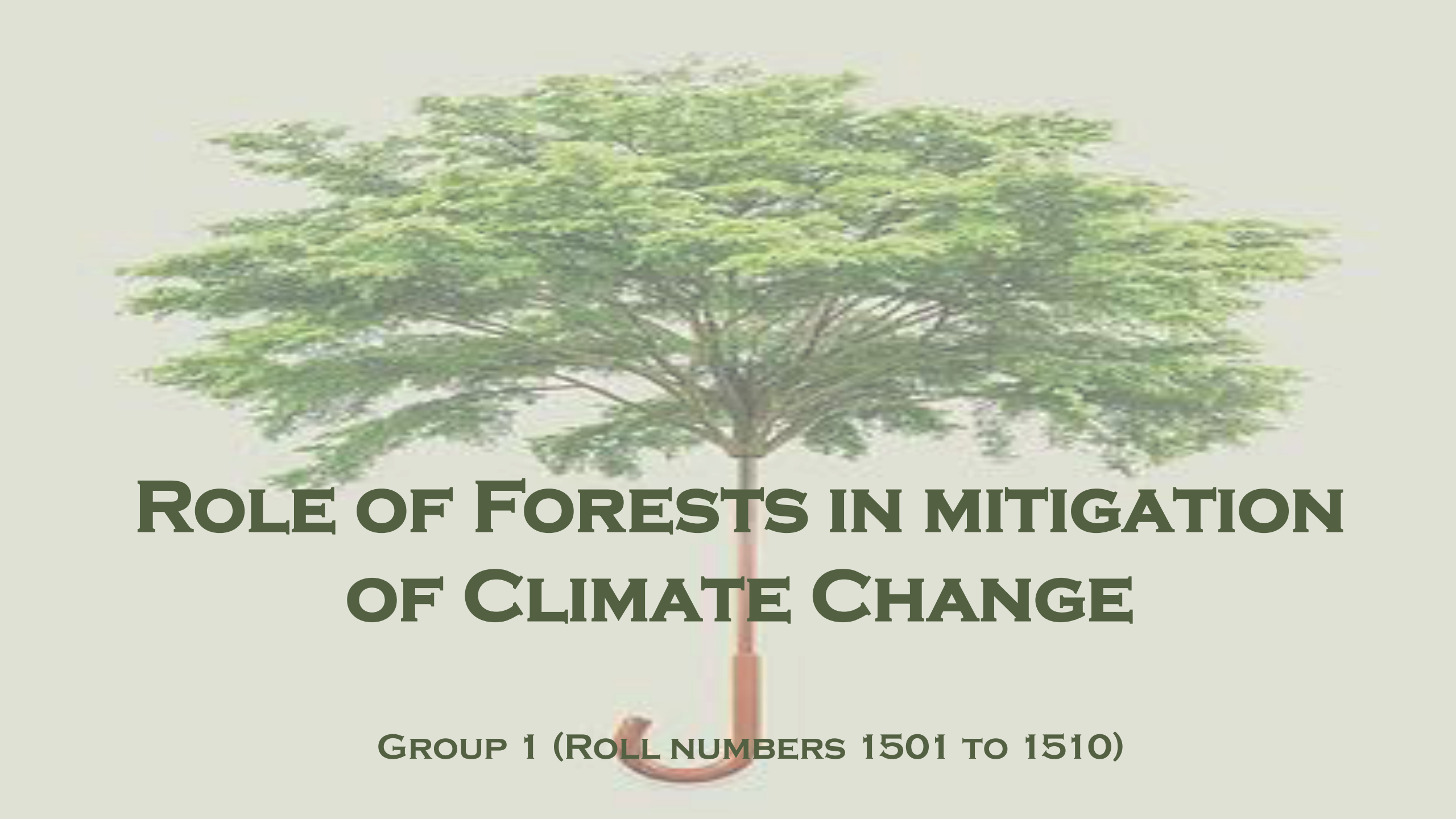


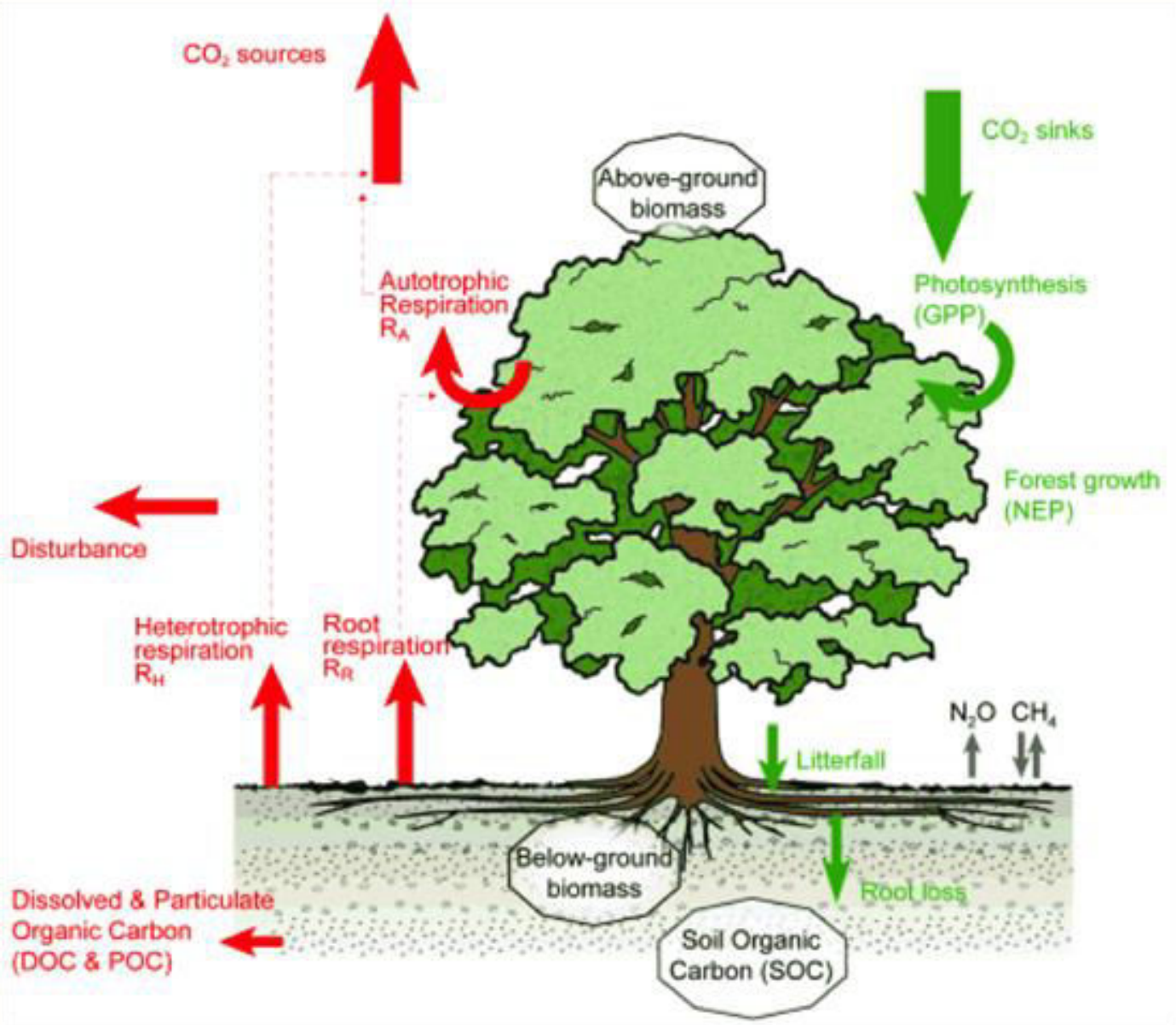
Role of Forests in mitigation of Climate Change

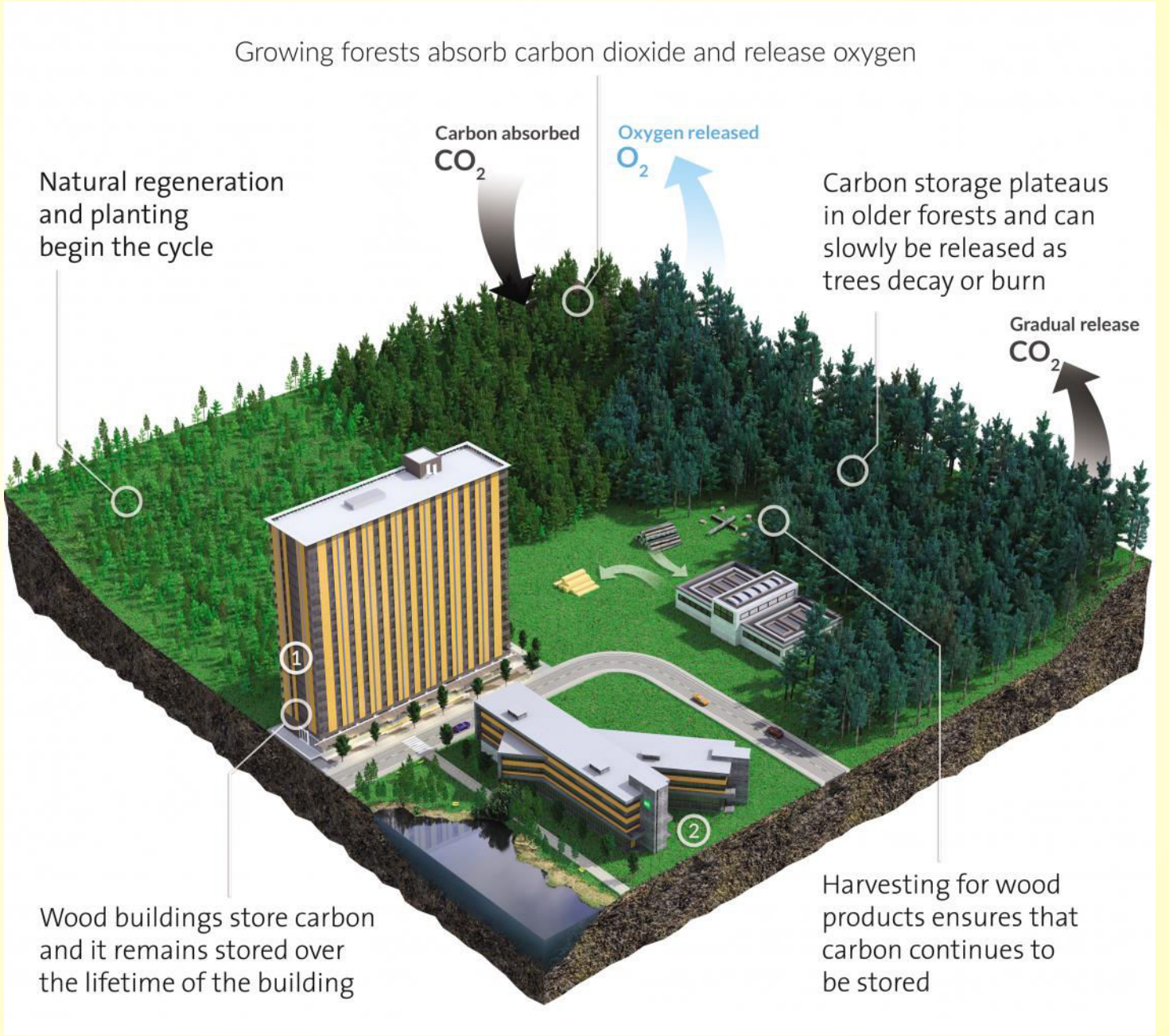
Group 1 (Roll numbers 1501 to 1510)

- Forest Carbon cycle
- Comparison vis-à-vis other sectors of mitigation
- Natural forests vs Tree plantations
- Actively managed forests vs Static forests
- Key Forest Mitigation strategies
- How to facilitate the maximum exploitation of this potential

Forest Carbon cycle

- Photosynthesis binds CO2 and stores it in form of complex carbohydrates
- Mainly in three pools –
  - Above the ground biomass
  - Below the ground biomass
  - Soil organic carbon
- The important role that forests have in addressing climate change was formally recognized in the Paris Agreement by specific inclusion of REDD+


CO_2 sources
CO_2 sinks
Above-ground biomass
Autotrophic Respiration R_A
Photosynthesis (GPP)
Forest growth (NEP)
Disturbance
Heterotrophic respiration R_H
Root respiration R_R
N_2O CH_4
Litterfall
Below-ground biomass
Root loss
Dissolved & Particulate Organic Carbon (DOC & POC)
Soil Organic Carbon (SOC)


Growing forests absorb carbon dioxide and release oxygen
Carbon absorbed
CO_2
Oxygen released
O_2
Natural regeneration and planting begin the cycle
Carbon storage plateaus in older forests and can slowly be released as trees decay or burn
Gradual release
CO_2
1
2
Wood buildings store carbon and it remains stored over the lifetime of the building
Harvesting for wood products ensures that carbon continues to be stored

Benefits over other sectors of mitigation

- Ecosystem services – e.g.
  - soil conservation
  - water-cycle enhancement
- Wildlife – food-web
- Timber & Energy from biomass
- Employment to local communities

Natural Forest vs Tree Plantations

- Primary forests store 30-70% more carbon than commercially logged forests and plantation forests
- The biodiversity of natural forests provide forest ecosystems with resilience and adaptive capacity, resulting in more stable carbon stocks
- Soil carbon component is more in Natural forests

Actively managed vs Static forests

- Faster growth – so more speed of carbon sequestration
- But the rotation period is important
- Timber benefits – Use of wood products is **Carbon negative**
- Biomass energy from residue
- In static, more inflammable objects– more fires

Key Forest Mitigation strategies

	Mitigation Activities	Type of Impact	Timing of Impact	Timing of Cost
1A	Increase forest area *(e.g. new forests)*			
1B	Maintain forest area *(e.g. prevent deforestation, LUC)*			
2A	Increase site-level C density *(e.g. intensive management , fertilize)*			
2B	Maintain site-level C density *(e.g. avoid degradation)*			
3A	Increase landscape-scale C stocks *(e.g. SFM, agriculture, etc.)*			
3B	Maintain landscape-scale C stocks *(e.g. suppress disturbances)*			
4A	Increase off-site C in products *(but must also meet 1B, 2B and 3B)*			
4B	Increase bioenergy and substitution *(but must also meet 1B, 2B and 3B)*			

Type of Impact	Timing (change in Carbon over time)	Timing of cost (dollars ($) over time)
Enhance sink 	Delayed 	Delayed 
Reduce source 	Immediate 	Up-front 
	Sustained or repeatable 	On-going

How to facilitate the maximum exploitation of this potential

- We need accounting systems that recognize such forest management actions and policy and rule settings that foster **primary forest protection**, restoration of degraded natural forests and re-forestation of natural forests in that order

- Working Plans must include carbon sequestration objective –
  - Selection system
  - Longer rotation periods

- Increasing the **stand-level carbon density** (tonnes of carbon per ha) through the reduction of forest degradation and through planting, site preparation and **tree improvement**

- **Increasing off-site carbon stocks in wood products and enhancing product and fuel substitution using forest-derived biomass to substitute products with high fossil fuel requirements**

- **Better Pest and Fire management and Forest protection to reduce leakages**

- **Agro-forestry and Urban forestry provides an example of a set of innovative practices designed to enhance overall productivity, to increase carbon sequestration**

- **Adaptive management e.g.**
  - **Shifting to species more productive under the new climatic conditions e.g. seabuckthorn**
  - **Increase biodiversity in plantations by multi-species plantations**
  - **Use of stocks from a range of provenances**
  - **Ecological corridors create opportunities for migration of flora and fauna, which facilitates adaptation to changing climate**
- **Building Institutional capacity (e.g. REDD+ Authority) as well as capacity building at ground level**
- **Investment in technology RD (e.g. wood impregnation)**
- **Framing appropriate policies**
  - **Reviewing blanket ban on felling**
  - **Wood first policy in public buildings**
  - **Incentives for Bio-energy**

- **Considerable progress has been made in technology development for implementation, monitoring and reporting of carbon benefits but barriers to technology transfer remain**

- **International cooperation via adequate and predictable finance (REDD+ vs CDM)**

- **In the long term, only integration of mitigation and adaptation strategies to promote sustainable forest management can develop our forests as resilient and efficient carbon sinks**

thank you!