



Mangrove Restoration Adaptation and Mitigation Aspects

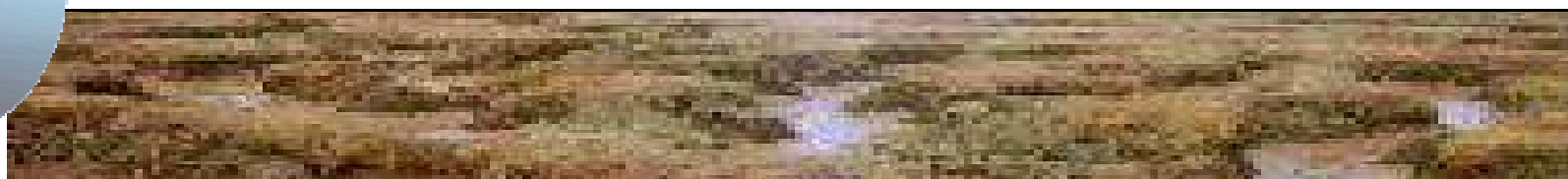
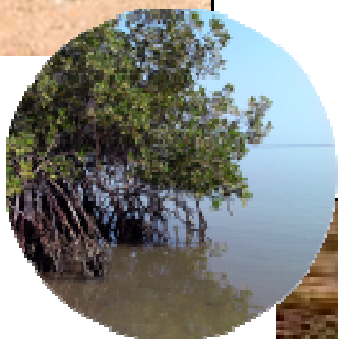
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Cancun, Mexico

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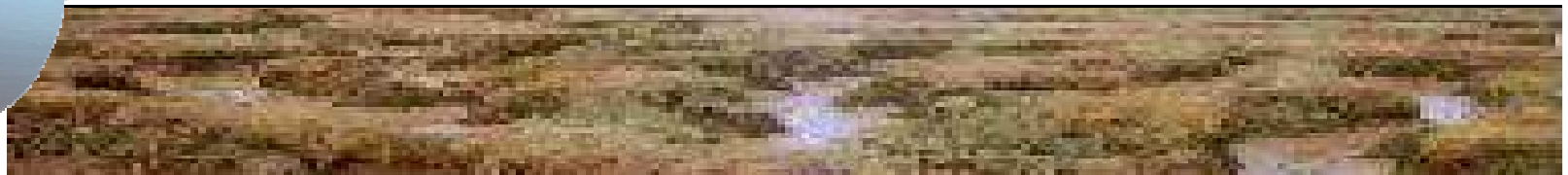
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Presentation Outline

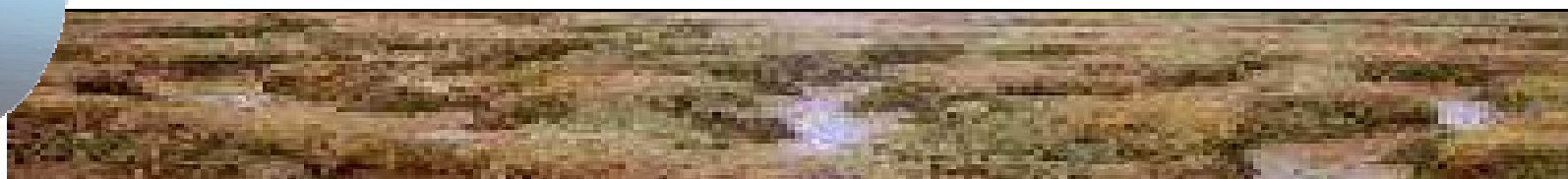


- Threats to Mangroves
- Adaptation Aspects
- Mitigation
- Standards and project cycle
- Carbon budget of / GHG fluxes in mangroves
- Issues and challenges
- Time table of methodology preparation



Threats to Mangroves

- Coastal developments
 - Habitat destruction (urban sprawl, tourist developments)
 - Prohibitive to inland migration of mangrove habitats
- Shrimp farming and other aqua-culture activities
- Population pressure (building materials, NTFP, settlements)
- Pollution
 - Nutrients (increased sewage discharge)
 - Chemical (industry, pesticide use upstream)
- Climate change
- **Result:** serious loss of mangroves around the globe (UNEP atlas)



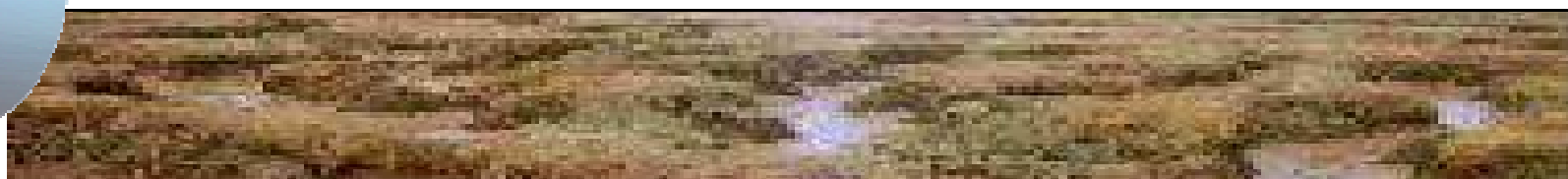
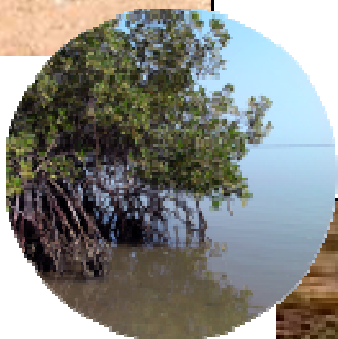
Adaptation

Climate Change Processes

- Sea level rise
- More extreme weather events
- Changing weather patterns – changing habitats
- Changes in upstream watersheds
- Migration inland of habitats (often physically blocked)

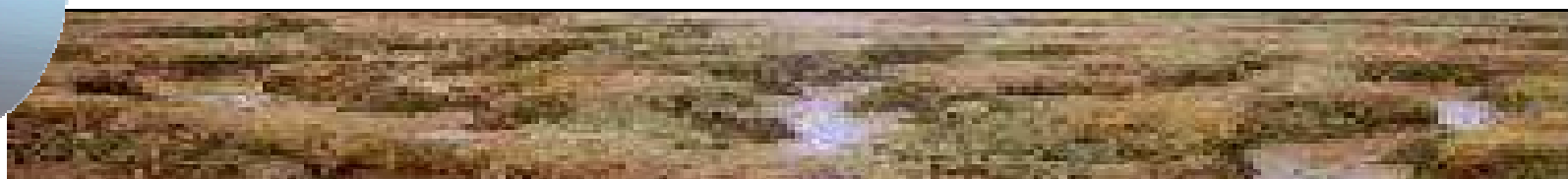
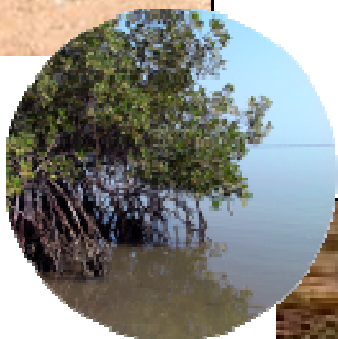
Adaptation Aspects

- Coastal defenses – coastal erosion
- Wave breakers
- Livelihood aspects



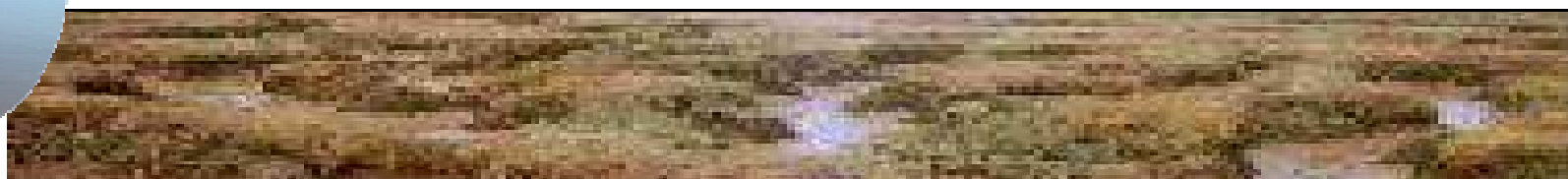
Mitigation Aspects

- Mangrove restoration – prohibiting loss
- Uptake of CO₂ – avoidance of emissions
- Projects: CDM, VCS, or other standards
- REDD+: national, sub-national, NAMAs, MRV,...
- Finance: nature conservation, carbon credits, payments for other environmental services, under UN-REDD



CDM “Reforestation”

- CDM: “Conversion of non-forest land to forest land either by natural regeneration or by planting.”
- Eligible land:
 - Demonstrate that the land at the moment the project starts is not forest;
 - Demonstrate that the activity is a reforestation project activity; and,
 - Demonstrate that the land was non-forest on 31 December 1989.



CDM A/R small scale methodology for wetlands



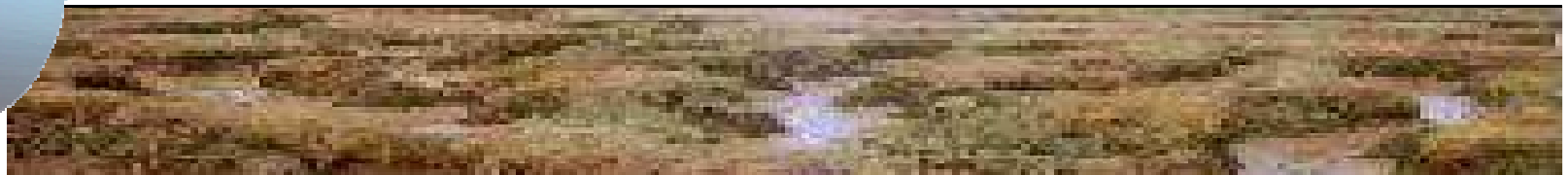
1. Applicability conditions are limiting the scope to reduce complexity

- Project activities are on degraded wetlands, which may be subject to further degradation and have tree and/or non-tree components that are declining or in a low carbon steady state
- No changes in hydrology (e.g. include drainage, flooding, digging or ditch blocking)
- Pre-project situation: areas used for agricultural activities (other than grazing) within the project boundary are not greater than 10% of the total project area
- Displacement of grazing animals does not result in leakage
- <10% of the total surface project area is disturbed as result of soil preparation for planting; organic soils: site preparation activities such as ploughing and drainage before or after the trees are planted are not allowed

2. Carbon pools limited to AGB and BGB of trees - to be extended with SOC.

3. Simplified baseline selection (= pre-project land used) – to be extended with full procedures for BSL.

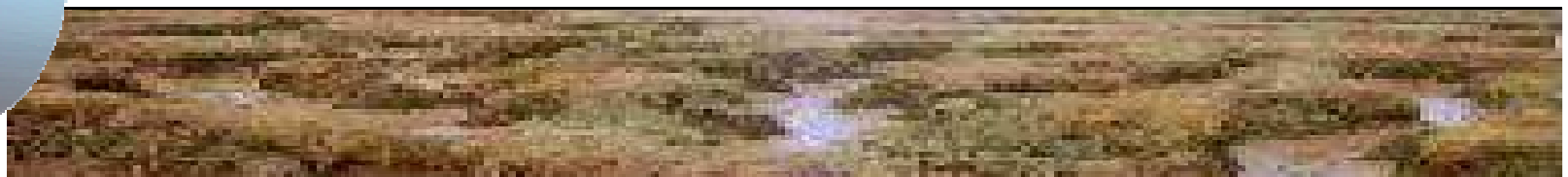
4. Simplified assessment of leakage – to be extended with full procedures for WPS.



Danone Fund for Nature

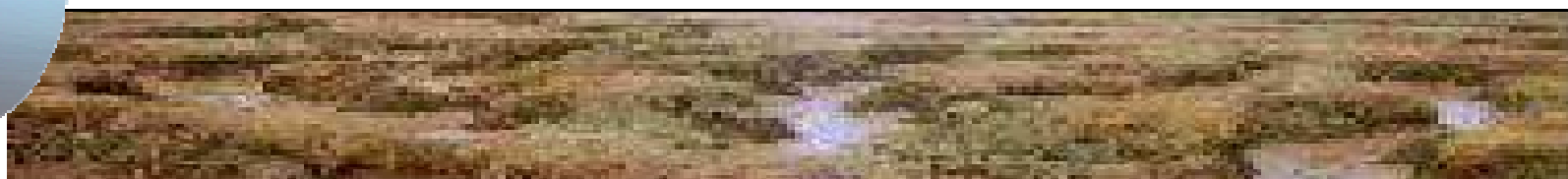
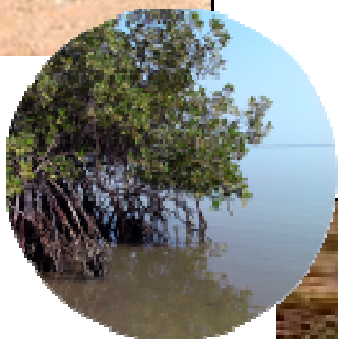


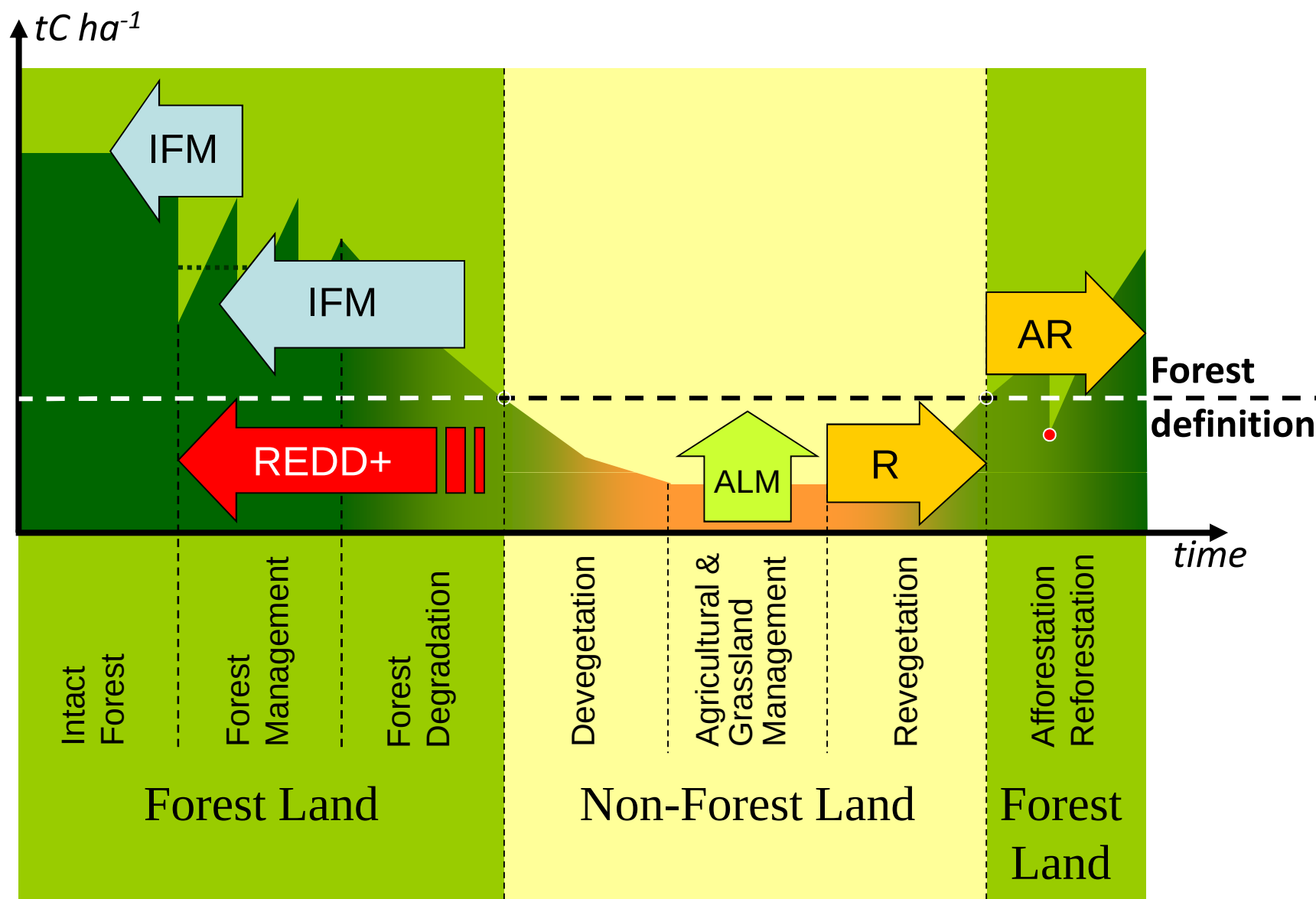
- Partnership to restore wetlands and thus restore biodiversity
- Danone: Expertise in water resource management, financial investment, catalyst and driving force
- Ramsar: Wetlands expertise, inter-governmental alliance credibility
- IUCN: Expertise in biodiversity, operational implementation, credibility
- Carbon sequestration
- Local socio-economic benefits

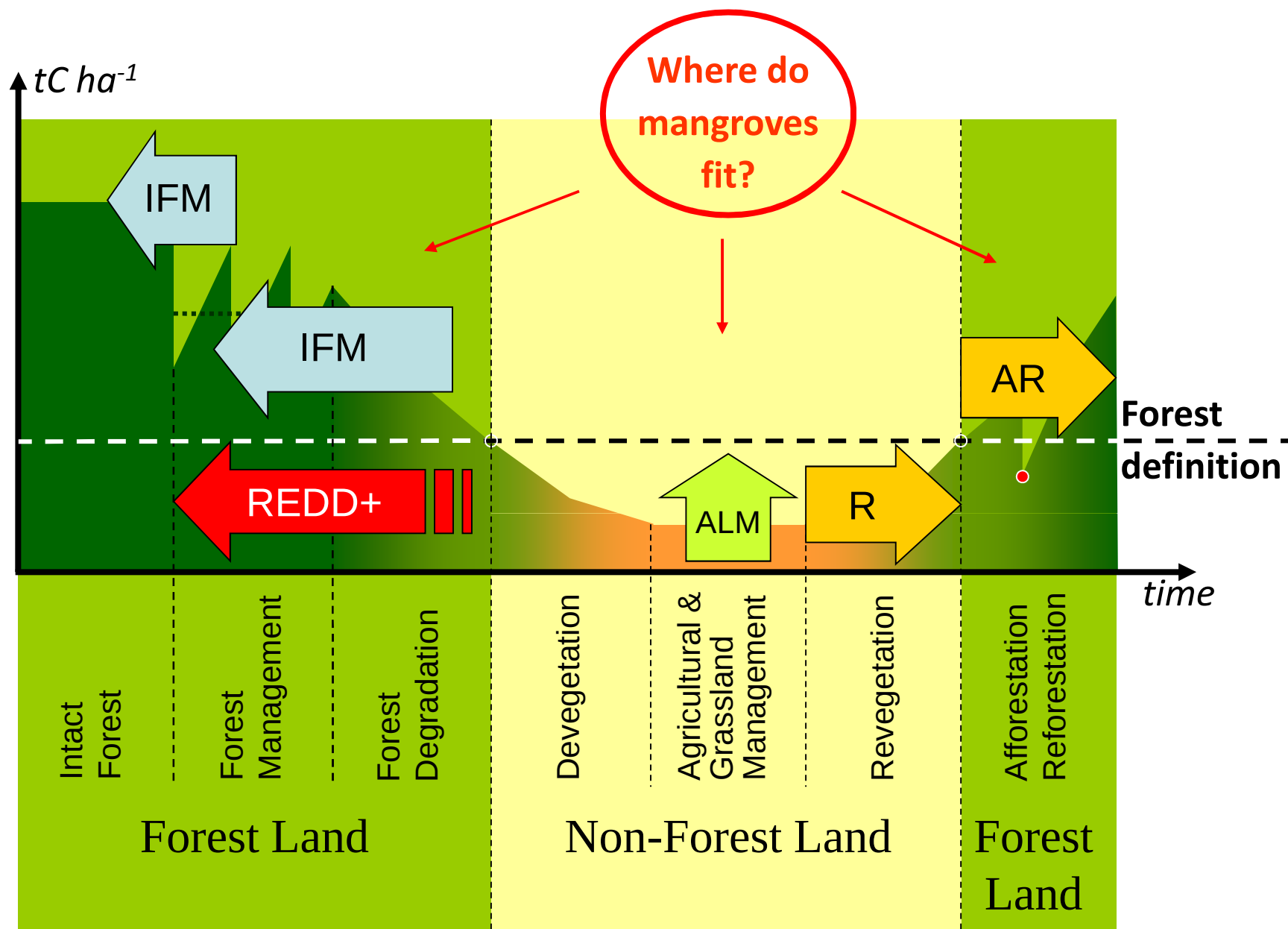


Alternative standards

- Other standards only apply to the non-regulated/ voluntary market (only CDM generates credits that can be used to meet compliance under the Kyoto Protocol)
- VCS - most AFOLU covered but approval procedures more challenging
 - VCS includes ARR, and therefore the forest definition is not relevant (sea grasses, kelp forests)
 - land eligibility requirements are limited to that the project area shall not be cleared of native ecosystems within the 10 year period prior to the project start date

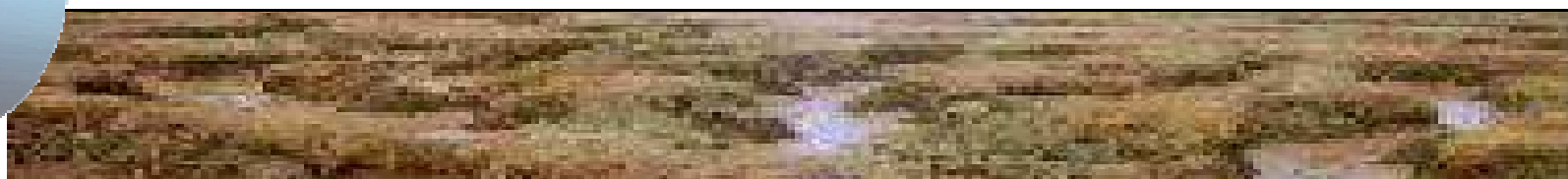
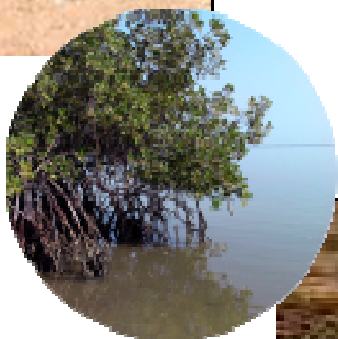






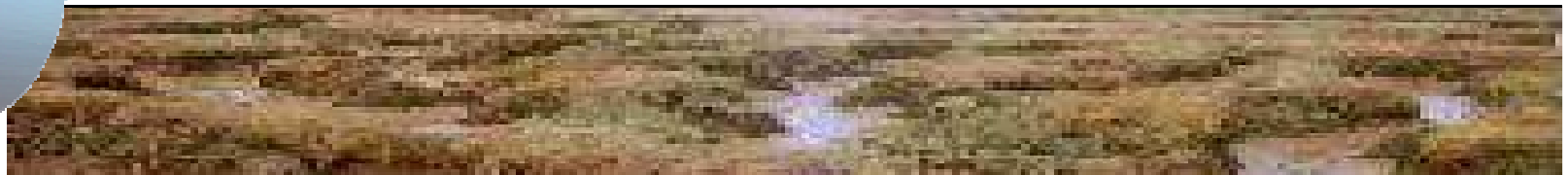
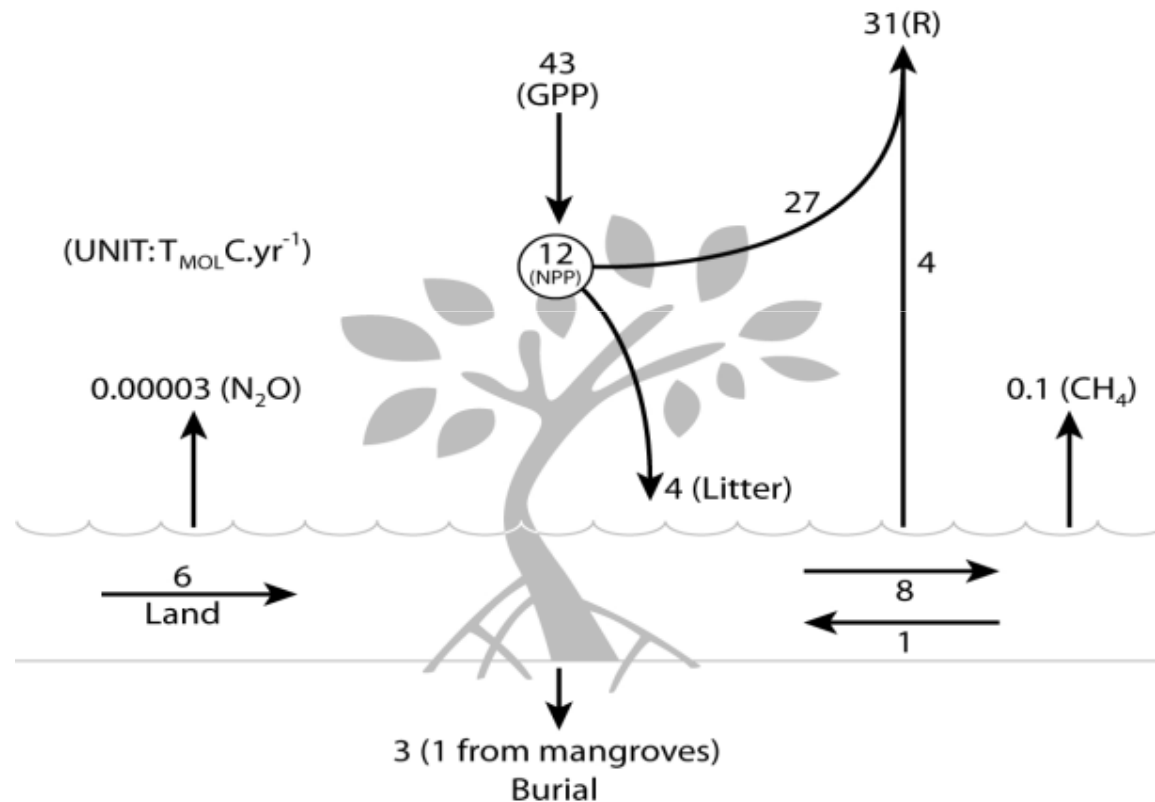
Carbon budget Mangroves

- Tree and shrub biomass (AGB and BGB)
- Soil Organic Carbon (SOC; >70% of total ecosystem C typically; 7-8 t/ha/yr of CO₂-e)
- As per IPCC, C assessments can track carbon via the gain-loss approach (integrating all fluxes) or the stock-change approach (comparing C stocks over time)
- For fluxes AGB and BGB versus N₂O and CH₄ see flow chart..



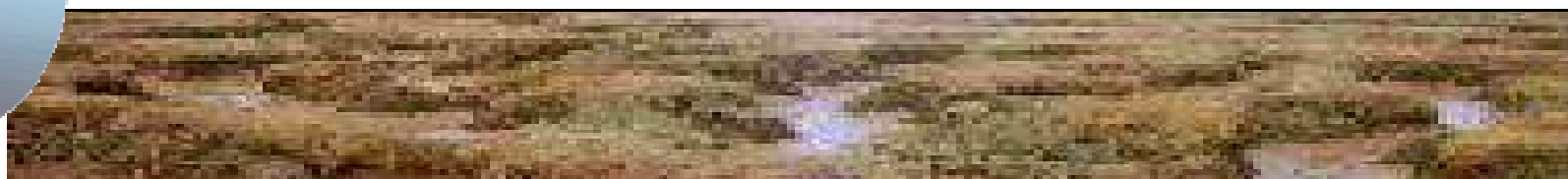
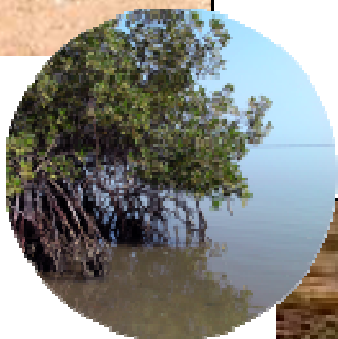
GHG fluxes in mangrove wetlands

An estimate of the major pathways of carbon flux through the world's mangrove ecosystems adapted from Alongi, 2007.



Mangrove GHG fluxes

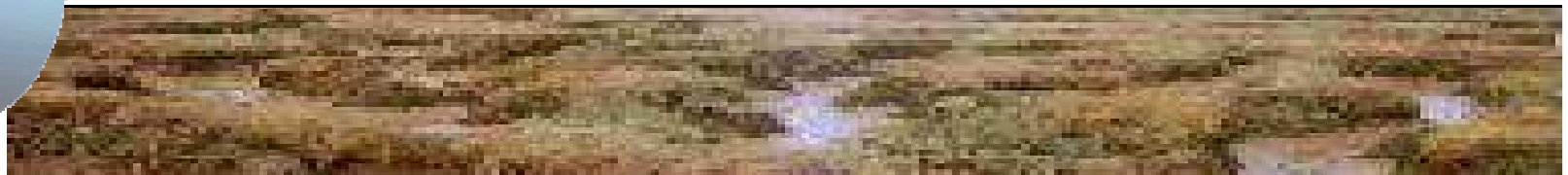
- Globally, mangrove ecosystems show a net uptake of CO₂ from the atmosphere of 12 TmolC yr⁻¹.
- CH₄ and N₂O gases are released from mangroves at a rate of 0.1 and 0.00003 Tmol yr⁻¹, respectively.
- Global Warming Potentials relative to CO₂ are 21 for CH₄ and 310 for N₂O.
- Mangroves show a net gain of carbon 17 times greater than CH₄ emissions (corrected for GWP) and 2500 times greater than N₂O emissions.



General approach for including a pool or GHG



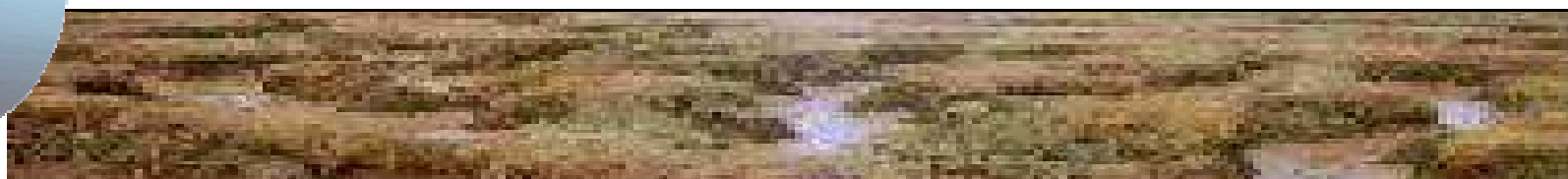
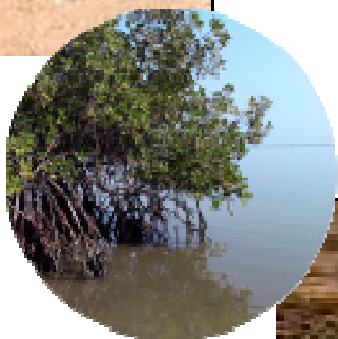
- Include full procedures if assessment/quantification is feasible (technically possible and affordable at the project scale)
- Include and adopt a conservative default value
- Exclude as per applicability condition
- For exclusion can be considered:
 - Changes in biomass and SOC
 - CH₄ emissions (fresh organic matter under wet anoxic conditions)
 - N₂O emissions
 - Lateral fluxes of carbon
 - Off-site emissions



Mangrove A/R methodology issues and challenges



- AGB and BGB
- SOC
- CH₄
- N₂O
- Soil types / stratification
- Changes in hydrology
- Tidal import/export
- Leakage





Time line and process

- Draft methodology out for review now with invited experts; deadline submission comments 10 December
- Completion of methodology: before end of year
- Submission to A/R Working Group of CDM January
- CDM Expert Review January – March
- Recommendation to CDM A/R WG meeting March 2011

THANK YOU.

