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Editorial

Icarus revisited: tropical forests, REDD+ and ecosystem dynamics

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advice being fully integrated into REDD+ strategies? I am fully convinced of the good

intentions of various organizations involved with the REDD+ process, but I am less sanguine that managers and scientists are in sync with the critical ecological issues.

There is no doubt that the science of quantifying and monitoring relevant ecological components of forests, such as measurement of carbon emissions and forest stocks, must conform to the practical realities and limitations of implementing mitigation strategies [3], and there are a number of practical manuals and book chapters to help with measuring, reporting and verification [4]. As pointed out by Donato, the sheer complexity of tropical forest ecosystems is a confining factor in how REDD+ projects are currently being implemented [3].

REDD+ project plans clearly need to evolve now that the first headlong rush to implementation and subsequent sober analyses are over [5]. Early and some current projects have focused on and been determined by:

- Location criteria based on biodiversity, climate and community benefits, threat of deforestation, environmental value, demonstrated user need, government/NGO interest, good governance, prior relation and experience with similar projects;
- Land tenure and concessional issues;
- Deforestation drivers;
- Financial arrangements and payment for environmental services;
- Political

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How ... I issue for REDD+. ... [2] as a guide for REDD ... s of level of forest co ... low deforest ... on rates. This the ... as a consequ ... incorporate ecosystem theory? Changes in forest carbon stocks vary over time in more complex



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REDD+ schemes must be able to deal with the issue of uncertainty, which is linked to the ecological reality of natural variability. Large uncertainties exist for rates of forest production, respiration and carbon balance, and these will change over time within any given forest. This is reflected in large uncertainties in global carbon budgets for forests [18,19]; some carbon is unaccounted for owing to rounding error or inadequate knowledge of processes such as faunal production and chemical defenses. In any event, any REDD+ scheme must reckon on uncertainties of up to 50% of some processes, not to mention nonlinearity, which is a common ecosystem trait [20].

What must REDD+ schemes do to conform to ecological reality? I have identified a few actions to take:

- The most crucial issue is geography in that, at the national level, not all sites will not be amenable to restoration due to permanent changes to hydrology, extensive damage, and so on; REDD+ efforts should be prioritized based on factors such as biodiversity, quality and quantity of remaining forest (e.g., mature old forest) and the value of ecosystem services;
- Spatial and temporal variability must be continually mapped and monitored, with a clear set of indicators to rapidly determine if changes in ecosystem structure and function are negatively impacting on REDD+;
- Communities that have been excluded from REDD+ schemes will not benefit; techniques, as a means of monitoring, are not typical
- There are multiple ways to restore key
- The most standard
- REDD+ preferab
- Priorit
- Parallel measurements must be made of environmental conditions such as

Sustainable conservation of replanted and restored forests will be successful only if ecological laws are enforced; the room for error is very small in every human endeavour to mimic nature.

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- A large white rectangular area, likely a placeholder for a figure or image, with a small circular logo on the left side. The logo features a dark blue circle with a white crescent moon and several small green and white dots. The background is a dark gray with faint, partially visible text from the adjacent page, including "1. Hunt C", "Warm", "Googl", "2. Angel", "Realis", "Forest", "Go", "3. Donat", "Manag", "4. Zhang", and "Carbon in a Changing Climate. Ashton MS, Tyrrell ML, Spalding D, Gentry B (Eds).".

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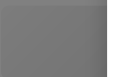
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