Long term monitoring of woodland cover and biomass carbon in African woodlands

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ABSTRACT

African woodlands are a substantial stock of carbon and biodiversity. They are under threat from frequent burning associated with unsustainable forms of agriculture (slash and burn) and charcoal-making (Campbell 1996). To protect them, it will be necessary to link their conservation to payments for avoided deforestation (Stern 2006). Already, this is being done on a small scale in 15 projects throughout Africa (Jindal et al 2007). On a large scale, it may in the future be possible to raise large funding under the terms of the Kyoto Protocol and, from 2012, its successor. In the latter case we expect development of a scheme of funding to support Reduced Emissions from Degradation and Deforestation (REDD).

In this case it will be necessary to monitor carbon stocks in a consistent way over decades. This requires a combination of visible and active-radar observation, as well as good ground determinations for calibration (Brown (2003). In this paper we prescribe the requirements for such a monitoring programme, and evaluate current and planned satellite programmes that might be useful for this purpose. The special difficulties of monitoring REDD over savanna woodland relate to the heterogeneity of the vegetation, the fine grain of the disturbance regime, and the marked seasonality of the vegetation. In this respect the problem is more challenging than for rain forest.

We conclude that the programme needs to include: spectral reflectance at high spatial resolution to detect changes in cover; p-band Synthetic Aperture Radar to detect changes in biomass; monitoring of fire frequency and lidar. We show examples to illustrate the strengths and weaknesses of existing and planned satellite sensors.

References

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