

Innovative approaches for protecting the future of Sierra Leone's Gola Forest – globally important for its biodiversity and its carbon reserves – are being developed by a collaboration of conservation agencies and Cambridge researchers.

## Canopy commerce: forest conservation and poverty alleviation

**G**ola Forest, situated at the westernmost tip of a once extensive swathe of forest that stretched a thousand kilometres from Sierra Leone to Togo, is classified as a biodiversity hotspot of global significance. Its 71,000 hectares are home to over 330 species of bird, including the rare White-necked Picathartes and Rufous Fishing Owl, more than 500 species of butterfly, and a long list of threatened and endangered plants and animals.

The forest, which was recently designated a National Park, is recovering from a history of commercial logging and mining, and areas have also been cleared by local communities for agriculture. Without protection, logging and mining activities would undoubtedly be resumed and destroy what remains.

But the forest is not only important for its biodiversity. Like other forests, Gola is a vast carbon store, both in the biomass of the trees themselves and in its storage of carbon as dead organic matter beneath the forest floor.

For the past 20 years, the Royal Society for the Protection of Birds (RSPB) has been working with the Conservation Society of Sierra Leone and the Sierra Leone Government to protect the Gola Forest. Safeguarding its future in perpetuity is a priority, as Dr Jeremy Lindsell, Senior Conservation Scientist at RSPB explained: "Without the Gola Forest Programme, it's likely the forest would eventually be lost. Our goal is to find a mechanism by which richer countries can help one of the poorest



White-necked Picathartes, endemic to the Gola Forest

countries in the world protect its nature at the same time as improving the livelihoods of the local communities."

Now, innovative approaches to forest conservation and poverty alleviation are being pioneered by two projects made possible by the Cambridge Conservation Initiative (CCI). Each project is a unique collaboration between researchers, practitioners and policy makers.

Plant scientists Beccy Wilebore and Dr David Coomes, with CCI partner organisations RSPB and the United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC), are conducting research for a scheme to fund forest conservation through carbon credits. And Dr Andreas Kontoleon and Dr Maarten Voors from the Department of Land Economy,

together with RSPB, BirdLife International and the Universities of Wageningen and Chicago, are working with local villagers to establish how best to reward them for forest conservation.

### Carbon credits for conservation

Current estimates suggest that around 12%–17% of global greenhouse gas emissions result from deforestation and forest degradation. A drive to reduce emissions from deforestation and forest degradation (REDD+) by incentivising countries to keep forests rather than clear them is currently being developed internationally by governments, conservation agencies, scientists and the private sector.

"Long-term funding for conservation of forests like Gola is difficult to secure, so

carbon markets offer one possible solution," explained Lindsell. "To do this, we must be able to demonstrate that the Gola Forest Programme is not only benefiting biodiversity, but that it is also reducing deforestation and securing the carbon stocks – essentially that our intervention makes a positive difference."

This is where the expertise of the plant scientists comes in. Wilebore, whose research is funded by the Natural Environment Research Council, is working with RSPB to determine how much carbon is in the forest and in the surrounding mosaic of land, which has been 'slashed and burned' for agriculture and is now regrowing as secondary forest.

"Once we know the baseline – the level of emissions we would expect from deforestation and forest degradation in the absence of the Gola Forest Programme – the impacts of the conservation programme on future carbon stores can be gauged," she explained. To calculate the baseline, she is gathering information from ground-based inventory plots, satellite imagery of land cover types and, soon, three-dimensional images of forest structure obtained by airborne remote-sensing devices. A rigorous system will be developed by the research partners to measure current forest carbon stocks and predict changes in forest carbon stocks in the future.

"An important aspect of the new methodologies will be to advise policy makers on the relative merits of different approaches for estimating how much carbon would have been lost if the forests had been left unprotected," added Coomes. "UNEP-WCMC will contribute greatly towards ensuring that lessons from the development of methods for Gola will influence the development of REDD+ policy at a critical point in time." Over the next year, the data will help the Gola Forest Programme assess how carbon trading can be used to protect the forest and at the same time cut global carbon emissions.

### Assessing livelihood impacts

Agreements have been struck with forest-edge communities to limit activities such as farming and hunting in the new National Park. In return, substantial funds have been set aside by the Gola Forest Programme for livelihood improvement for these communities. The funds support such projects as the building of schools and latrines, as compensation for benefits that have been foregone.

Although it's widely acknowledged that, to be successful, conservation programmes must be coupled with poverty alleviation schemes, "there is scant hard scientific evidence on the impact of conservation policies on livelihoods, or on specific aspects of human behaviour that are related to conservation," explained Kontoleon. The project he leads aims to address this gap.

Pooling expertise from economics, anthropology and conservation science, the



Exposed tree trunks visible in the Gola Forest are the telltale sign of human activity in what might otherwise appear to be thick forest

team has carried out extremely detailed surveys of more than 2,800 households across 180 villages during the past two years. This has provided a 'pre-treatment' baseline recording all aspects of the villagers' economic and social lives.

With the support of the Gola Forest Programme, the team then tested the impacts of a series of different conservation–livelihood interventions using randomised field experiments with 'treated' and 'control' groups (within ethical experimental norms).

For example, in one study, they experimentally assessed ways to improve co-operative behaviour within communities, given that pro-social behaviour is known to be essential for the effectiveness of conservation programmes. In another study, they evaluated how effectively conservation funds intended for community projects were actually spent under different managed regimes. And they explored how social cohesion and support for conservation can be best advanced by comparing aid payments allocated to village chiefs versus funds allocated directly to individuals, or through a voucher-for-work scheme.

After a return visit for a follow-up survey, the researchers are now analysing the data, with results expected early in 2012. "All in all, the project will provide the first detailed formal policy evaluation of a major conservation programme," said Kontoleon. "The results should allow us to derive reliable inferences on the livelihood and behavioural impacts of conservation policies."

### Predicting change

Over the next year, the two project teams will begin working more closely. Their combined data will help the researchers understand what drives changes in land use, and what effect this has on the environment and the impact of support programmes. Against a background of a rising world population and an increasing demand for food, studies such as these will prove vital for balancing

global pressures at the least cost to biodiversity.

The Gola Forest Programme might be regarded as something of a test case for how a large and dynamic biodiversity conservation project can be implemented sustainably in a developing country. "The stakes are high in terms of the biodiversity and carbon that is at jeopardy, the impacts on human welfare, and the conservation funds spent," said Kontoleon. "A vital ingredient for the success of the research projects in providing reliable assessments is the degree of collaboration, nurtured by CCI, between academia and conservation organisations, which cannot be taken lightly."



Dr David Coomes (left), Beccy Wilebore and Dr Jeremy Lindsell (Dr Andreas Kontoleon not shown)

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