Initiatives aiming to Reduce Emissions from Deforestation and forest Degradation, and conserve, sustainably manage or enhance forest carbon stocks (REDD+) can help to deliver important benefits in addition to their primary goal of carbon management. Such co-benefits include conservation of forest biodiversity and maintenance of ecosystem services.
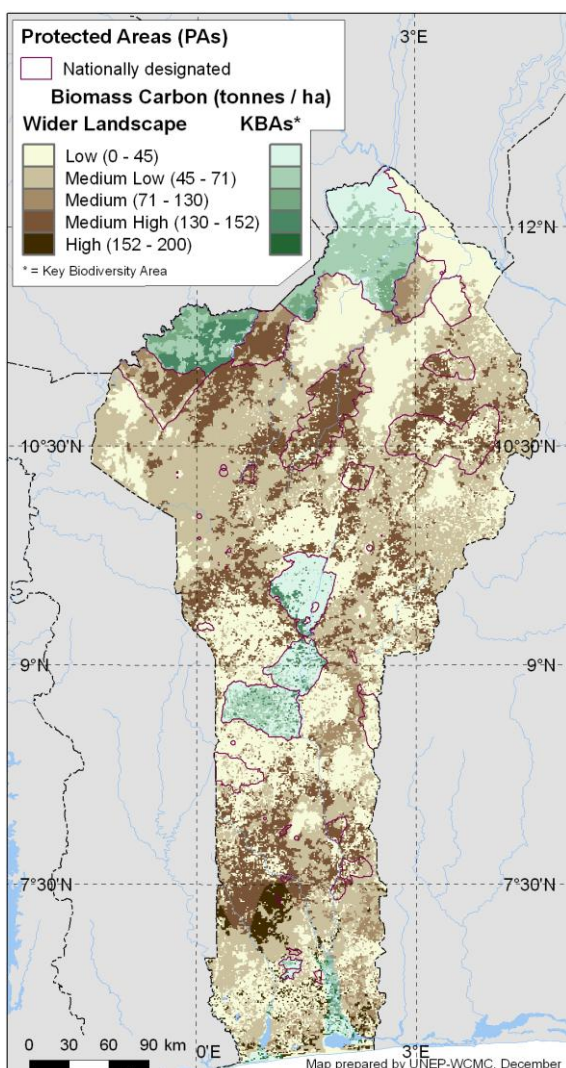
Benin

Land area: 110 620 km[2] (1)
Population: 8 054 000 (2007 estimate, 2)
Bordering countries: Togo, Nigeria, Burkina Faso, Niger
Forest extent: 45 610 km[2] (1)

REDD+ and its potential co-benefits are important in Benin, where almost 1.1% of forest area is lost each year (1), primarily through conversion for agriculture and overexploitation, facilitated by weak enforcement of the law (3). Benin's forests are rich in biodiversity, and make an important contribution to rural livelihoods. REDD+ could help maintain these valuable resources.

Carbon in Benin's biomass and soil

Benin's terrestrial carbon stocks total nearly 1.4 Gt, comprised of 662 Mt of carbon in above- and below-ground biomass (Map 1) and 697 Mt in soils (to 1 m depth, Map 2).

Both biomass and soil carbon are distributed unevenly over the country; areas of highest biomass carbon density contain 6% of Benin's biomass carbon but cover only 2% of the country's land area (i.e. around 2 100 km[2]; Figure 1). More than three quarters of Benin's land is medium low or low in biomass carbon, but a few of these areas appear to have high stocks of soil carbon.

Map 1 Distribution of biomass carbon, Key Biodiversity Areas (KBAs) and protected areas (PAs) in Benin (underlying data from 4; 5; 6; 7)
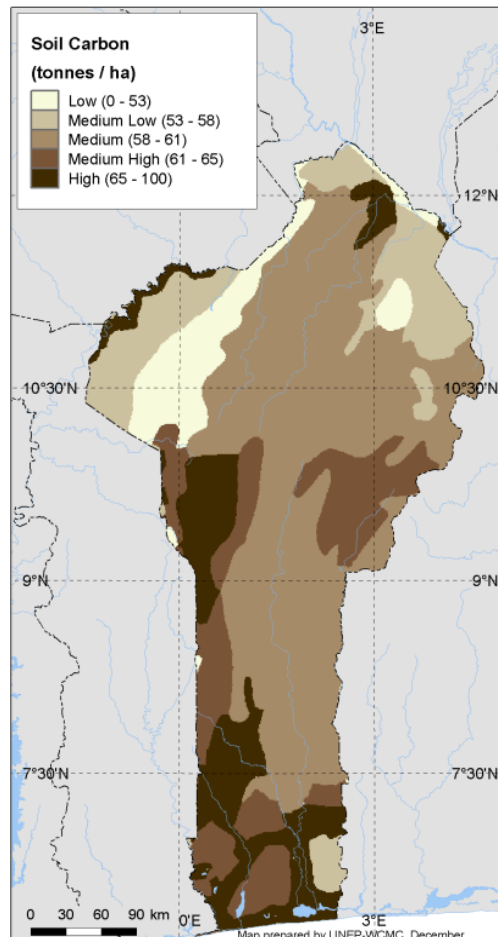
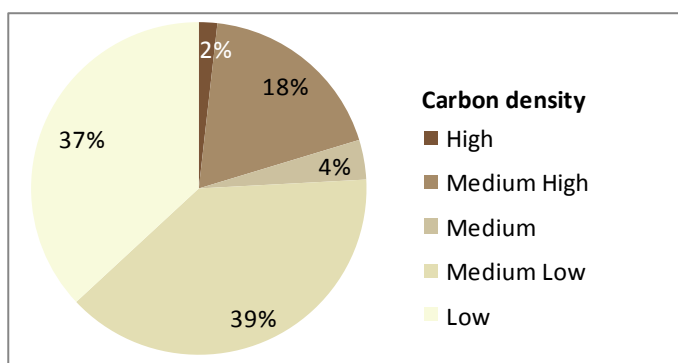**Map 2: Soil organic carbon stocks of Benin** (underlying data from 8)

Figure 1: Percentage of country area covered by different biomass carbon density classes

The importance of soil carbon should not be undervalued, and options for its management should be considered in the development of national strategies for climate change mitigation.

Carbon, biodiversity and protected areas

Key Biodiversity Areas (KBAs) are areas of high priority for biodiversity conservation that have been identified by stakeholders in country according to internationally agreed criteria (9). The six KBAs that have so far been identified in Benin (Map 1) cover almost 15 000 km^2 of land, and include 76 Mt of biomass carbon and 91 Mt of soil carbon. Only 1% of the land within KBAs (213 km^2) has high biomass carbon, representing 10% of the high carbon area in the country. Most of the areas important for biodiversity have lower biomass carbon.

Benin has 49 nationally designated protected areas covering around 27 150 km^2, or 23% of its total land area (Map 1), which in total contain about 174 Mt of biomass carbon (and 159 Mt of soil carbon). They cover 4% of the land area that is both high in biomass carbon and of biodiversity importance (defined as being located within a KBA). Of the 41 Mt of biomass carbon stored in land that is high in carbon, only about 0.6 Mt (around 1%) are in protected areas (Figure 2). In total, 96% of the land area important for both carbon and biodiversity has no form of legal protection.
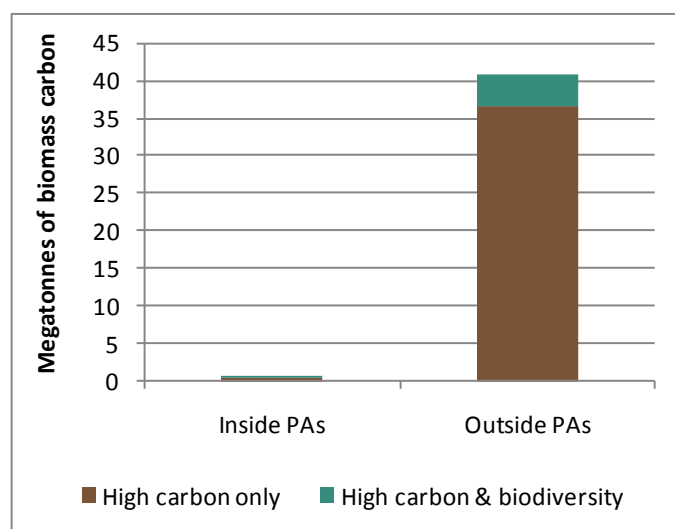

Figure 2: Biomass carbon from areas that are high in carbon and of biodiversity importance inside and outside protected areas (PAs)

Well-designed REDD+ interventions in these areas are likely to provide a considerable benefit to biodiversity. Similarly, projects that improve the effectiveness of protected areas in retaining both forest carbon and biodiversity value may make a significant contribution to REDD+ in Benin.

Further development

These preliminary analyses are based on regional and global data. They represent a first step in exploring the potential for co-benefits to arise from carbon management for climate change mitigation under REDD+ in Benin. Any future work should be conducted in close collaboration with national stakeholders and institutions to ensure that national priorities are considered and best available national data are used. Further analyses could build on these first results by: improving the carbon map; integrating additional datasets on biodiversity and ecosystem services; and exploring how pressures on carbon (e.g. infrastructure, mining) relate to carbon distribution.

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