

# Forest in Military Through Cartography: the Case of the McCrady Training Base

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## Abstract:

This work is part of the PRIN (Italian Project of Relevant National Interest) project named SYLVA, aimed to investigate the overlapping constructs between biology and artificiality, nature and society, wilderness and humanity. The SYLVA project is managed by four academic units within Italian universities. The University of Padova's unit has the main goal to study the sylvan (~forests) as a "refuge" and the evolution of forest units with human activities, such as illegality-criminality, military and geopolitics, intellectual-recreational-educative, and diversity (biological and cultural). The main goal of this research is the study of the interactions between human activities, forests and soils in the area of the McCrady Training Center in South Carolina (Figure 1).

McCrady, the Training Centre for the South Carolina Army National Guard, occupies the south-eastern one-third of Fort Jackson Military Base (6.331 ha). The Fort Jackson Military Base, located east of Columbia in Richland County (Figure 1), is the largest (21.043 ha) and most active training facility in the USA. The base was created in 1917 as the USA entered WWI. The Fort Jackson Military Base crosses the Sandhills, an area characterized by an alternating sequence of floodplain organic-rich sandy soils at the valley bottom and sandy soils on hillslopes and ridges. This soil pattern produces a variety of vegetation assemblages which vary from almost desert-like to tropical. The tropical soil pattern, bordering the major watercourses, is characterized by taller trees as red bay, loblolly bay and bald cypress in the overstory. Drier areas are characterized by mostly xerophytic community. Planted pine covers much of the undeveloped areas of Fort Jackson.

The main research aims addressed in this presentation are related to: 1) the representation in historical cartography, 2) changes in forest cover during the last century, 3) the role of the trees and the forest in human activities during the last three centuries. To address these aims, we built a historical GIS including georeferenced small and medium-scale historical maps and digitized forests. In particular, we used historical topographic maps, aerial photographs, and satellite imagery. Other GIS data such as DEMs from LiDAR data, land cover, soil maps, and the National Wetlands Inventory (NWI) databases were included. To integrate and validate data, field surveys, historical photos, written documents and interviews were used.

A brief description of historical maps as examples of different representation of the study area since the colonization times are next described. The selected maps are emblematic as they show different phases of the territorialisation process in the Sandhills context.

**John Speed map, A New Description of Carolina.** This map (1676) at 1:1,900,000 scale (David Rumsey Map Collection) depicting the colonial period, evidenced that Fort Jackson is located in an area crossed by a road following the fall line. This area was depicted as a sandy deserted area. In general, this map shows territorial opportunities and the still limited geographical knowledge of the interior.

**The Richland District of the Mills Atlas.** This map (1825) at 1:127,000 scale of the antebellum period, focused on the road network and main morphological features such as fluvial terraces, ponds, hills. Robert Mills (the cartographer) used two differs symbol assemblages for forested areas along the rivers, probably distinguishing between the permanent swamped forested wetlands (such as along the Broad River) and temporarily wet forests along creeks. The main aim of this cartographical product was to work as a topographic base supporting territorial planning and urban development.

**Special Military Map of War Department Corps of Engineers, U.S. Army of Camp Jackson.** This topographic map (1920) at 1:20,000 was created to depict a comprehensive view of the terrain and forest cover of Fort Jackson. It depicts dry forests and shallow forested wetlands using different symbols, local roads and millponds, together with small rural settlements, abandoned after the construction of the base.

**Five USGS topographic maps.** These topographic maps (1953) at 1:24,000 scale, provide evidence of the major changes in the landscape (forest cover and anthropogenic features) which occurred after the establishment of the military base. Older settlements and many of the pre-base roads were abandoned while new unpaved paths and firebreaks were created.

The two historical map sources (i.e. 1920, 1953, see Figure 1), together with historical aerial photography in 1943, 1981 and satellite imagery in 2015 provided bases for digitizing the forests and performing qualitative and quantitative diachronical analysis of the forest cover in the McCrady area. A first diachronical analysis of the forests shows an increase in the forest cover during the last century (from 1920 to 2015). To better understand and interpret this trend, a study of the use of trees and woods in the military area in the last centuries was fundamental.

Before the European colonization, the area was characterized by small groups of Native Americans hunters and gatherers without stable settlements, in a land which supported a desert-like vegetation. At the beginning of the 18th century, the European settlers started to transform the landscape, with large land clearings and plantations. The Europeans also built mills and roads to create a network connecting the settlements, serving subsistence agriculture. The antebellum period witnessed the growth of large cotton plantations located in the fertile lands of Lower Richland County along the major rivers. Moreover, this period saw the beginning of soil exhaustion and a consequent heavy outmigration of population to the more fertile lands offered by the New South-Western States (Alabama, Mississippi and Louisiana). After the Civil War, Richland County remained a predominantly agricultural land, characterized by small farming communities.

At the time of the establishment of the military base, the area was characterized by the presence of large agricultural terraced slopes, still recognizable in the modern microtopography (noted from LiDAR digital terrain models and historical photos). This land is now impacted by heavy military and forestry activities such as large controlled burns to prevent the growth of the underwood, intensive training explosion activities, construction of large amount of unpaved roads and firebreaks, massive passage of heavy vehicles and abandonment on the ground of military materials.

Since the creation of the military base, trees –once exploited mostly as construction materials– now have an important role in military training activities; for example, as cover during fighting simulations and to hold targets. Despite a general trend of an increasing forest cover, the changes in the land use in the area of the base also brought severe problems related to deep soil erosion localized in the proximity of unpaved roads and fire breaks, especially where they are incised in sandy deposits and palaeosol. The erosion produces unconsolidated sediments that are then moved by water, especially during major rainfall events and finally re-deposited in localized depressed areas. A dramatic example of this process occurred during the 2015 flood, which also caused major damages in the south-eastern part of the city of Columbia. The heavy rainfall event enhanced previous erosion phenomena and produced many new sources of sediments, especially from uplands with a poor or no canopy cover. In general, the landscape that had been stabilized in the past by agricultural terraces appears nowadays particularly impacted along the forest-human interface, with phenomena such as root erosion at the anthropogenic margins of woodlands. New gullies were created and older gullies were further incised.

New maps regarding the evolution of forest coverage, soil erosion and re-deposition of sand were produced and included in a ‘story map’, illustrating the changes in the relationships between trees and human activities during the last three centuries.

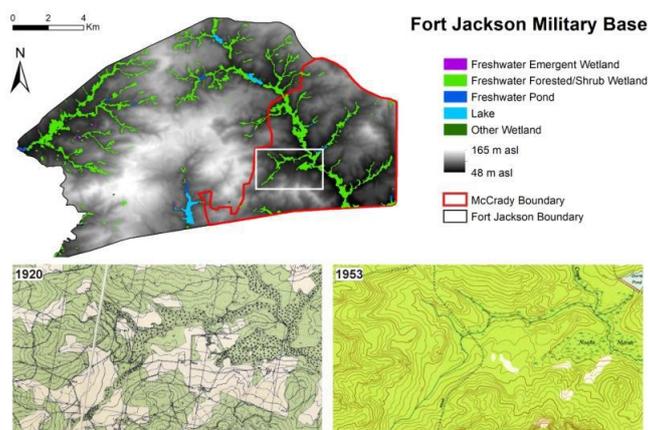


Figure 1. Fort Jackson Military Base DTM and wetlands. The two historical maps show an example of diachronical comparison of the forest cover between 1920 and 1953 of an area in the McCrady Training Center.