



Pre-Columbian raised fields in Panama: First evidence



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ABSTRACT

This paper reports on the first documented evidence for Pre-Hispanic ridged fields in Panama (Chinina, Eastern Panama Province, Pacific), identified in online aerial photographs, and the results of the field work carried on in 2011.

Aerial photography has been known as an extremely useful tool of archeological prospection for nearly one century. In recent years however it gained increasing importance by two reasons: First the availability of high quality aerial photographs via internet made it quite easy to start archeological surveys even in remote areas. Second archeological perspectives on past human societies changed in recent decades. Modern ecological problems caused an increasing interest in landscape archeology.

In Panama, archaeobotanical and paleoecological studies were carried out by Dolores Piperno and her team, already since the 1980s. The results of this research contributed to understanding American agricultural development especially related to the manipulation and domestication of plants and human/environmental interactions. However, despite this important role of the Panamanian evidence for the overall discussion of the development of agriculture in tropical environments, there has been little data generated on agricultural practice and land use pattern until this project.

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In the Americas, raised fields have been documented in several regions, for example, Mexico (Siemens, 1983), Colombia (Broadbent, 1968; Parsons, 1966; Plazas and Falchetti, 1981; Plazas et al., 1993), Ecuador (Bouchard and Usselman, 2006; Gondard, 2006; Marcos, 1987; Parsons, 1969), Peru (Pozorski et al., 1983), Bolivia (Denevan, 1963, 2001; Erickson, 1995, 1996; Smith et al., 1968), Venezuela (Gassón and Rey, 2006; Zucchi and Denevan, 1979) and the Guianas (Iriarte et al., 2010; 2012; Mckey et al., 2010). Although were present from the Caribbean coast to the Andes (Denevan, 2001; Rostain, 2008), they all manage agrarian land in floodplains. Several drivers have been proposed for the construction of these kinds of fields: mitigating high water levels in floodplains, controlling drainage, enriching the soil with fresh nutrients, and influencing microclimate particularly humidity (Denevan, 2001; Erickson, 2008). Prior to this study, the most extensive hydraulic system nearest Panama was located in the San Jorge river floodplain in the Caribbean lowlands of Colombia. This complex system of seasonal swamps, lakes and sloughs covered

approximately 500,000 ha (Parsons, 1966; Plazas and Falchetti, 1981; Plazas et al., 1993). Extensive archeological research has assigned the beginnings of landscape transformation and the first dense human occupation there between 2000 and 1000 uncalibrated years BP (Groot, 2009; Plazas and Falchetti, 1981).

In Panama the first evidence of raised fields has been identified in Chinina, Eastern Panama (Fig. 1). This region, known as Gran Darien, has an archeological sequence that starts with Palaeoindian materials found in Lake Alajuela and the Pacific entrance to the Canal (Bird and Cooke, 1977; Ranere and Cooke, 2003), as well as data obtained in paleoecological studies in the regions, such as those in the river Chagres (Bartlett and Barghoorn, 1973; Piperno, 1985), Monte Oscuro (Piperno and Jones, 2003) and the area of Cana on the border with Colombia (Bush and Colinvaux, 1994; Piperno, 1994) (Fig. 1).

In the Gatun Basin for instance, 100 km northwest of Chinina, evidence of maize was found dating to around 4600 BP (Piperno, 1985). In core samples taken at Monte Oscuro, 100 km west of Chinina, significant burning of the vegetation (charcoal) and increases of weedy plants occurs at ca 7500 to 7000 radiocarbon years BP, indicating disturbance, most probably attributed to human occupation of the forest and the development of slash-and-burn methods of cultivation (Piperno and Jones, 2003:79). Maize phytoliths were found alongside a decrease in

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Fig. 1. Geographical location of studied area.

evidence for arboreal taxa and an increase in early successional taxa such as *Heliconia*, and those from the Poaceae family (Piperno and Jones, 2003:84).

At Cana Swamp in Darien, which lies about 200 km southwest of Chinina, more evidence of human disturbance of the rainforest was also found with charcoal deposits, together with the continuous presence of maize pollen in all levels dating from around 4000 BP until the Spanish conquest (Piperno, 1994). Thus these studies reveal that in the East of Panama, human groups developed productive agriculture by 5000 to 4000 years ago. However it must be said that no palynological studies have been carried out in the 300 km between Monte Oscuro and Cana, which is situated adjacent or within the Bayano river watershed, a densely populated area that was home to several important chiefdoms according to 16th century accounts (Cooke, 1984).

The archeological cultures of the Gran Darien are characterized by the preeminence of plastic decoration and the almost total absence of paint in most of the ceramics reported in the region (e.g. Biese, 1964; Linné, 1929; Lothrop, 1954, 1959, 1960; Torres De Araúz, 1992; Cooke, 1976; Drolet, 1980; McGimsey, 1964; Martín, 2002a, 2002b, 2006, 2007; Mendizabal, 2004; Stirling and Stirling, 1964) and in the area to the east of Panama City and Bayano river (Cooke, 1973; Torres De Araúz, 1971a, 1971b, 1975; Martín and Etayo, 2006). Linné (1929) had observed this ceramic homogeneity, and he included the Pearl archipelago within the region, as did Bray much later on (1984), establishing a maritime connection between the Panamanian and Colombian Pacific coasts, a link that has been confirmed through more recent research in the Pearl islands (Cooke et al., 2010; Martín and Sánchez 2007).

1. The Chinina site

Aerial photographs provided by Google show raised field structures near Chinina, approx. 55 km east of Panama City near the estuary of the Bayano river, a hundred meters or so from the Pacific coast (Fig. 2). The site is located in the Pacific coastal plain of Panama, within the Holocene alluvial fan of the River Bayano river which is crisscrossed by smaller water bodies, many of these of a seasonal nature (Fig. 3).

The landscape today consists of pastures with small forested remnants, for the last 20 years used primarily for cattle grazing. Aerial photographs from the 1970s show that the area was covered with continuous tropical seasonal forest at that time. Given the steady wet season (May–December) precipitation of 1650 mm/year, the proximity to the sea and groundwater conditions, the area is flooded seven months of the year. Thus, agricultural usage required a complex transformation of the landscape.

2. The raised fields

The raised fields consist of at least 22 blocks of parallel banks and ditches. These are about 50 m in length, 2.5 m in width and 0.6 m in height. Between the ridges associated parallel ditches provided the function of retaining enough water for the dry season. The whole system is associated with a stream that flows down from northeastern hills, and seems to be artificially channeled towards the flat plain (Fig. 4).

The most visible ridges cover ~30 ha, just 1500 m E-SE of the described area, other less clear structures are visible in the aerial photographs (Fig. 3).

3. The survey in Chinina

In order to check the accuracy of the aerial photographs the site was visited for the first time in March 2011, for ground-truthing the structures discovered in aerial photographs. They were clearly visible on the ground.

In June 2011, twelve days of survey were carried out. The survey technique used was field walking on 10 Ha and target sampling in areas with archeological potential (Fish and Kowalewski, 1990). Finds were registered by handheld GPS device providing an accuracy of approximately 5 m.

The survey area includes three slightly different terrains: 1) the flat coastal strip with the vestiges of the fossil fields, 2) terraces slightly more elevated than the rest of the plain, and 3) low hills in the northeast.

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