# Methods

To understand how migration affects forest use and forest management in Oaxaca, we conducted multi-sited research with five indigenous communities in the northern highlands (Sierra Norte), and a migrant diaspora spread across Mexican and USA destination centres. These communities are the Zapotec of Santa Maria Yavesia and San Juan Evangelista Analco, and the Chinantec of Santiago Comaltepec, Santa Cruz Tepetotutla, and San Miguel Maninaltepec. While these five study communities represent different ethnicities, population sizes, territorial configurations, and forest types, they share similar histories, land uses, and a way of life based around territory, collective work, communal governance, and ritual celebrations (Martinez Luna 2010; Robson *et al.* 2017).

Our data come from related studies conducted since 2007. While our original methods vary somewhat across these cases, they are all ethnographic in approach, allowing us to compare migration-community-forest linkages*.* Key methods included household surveys, semi-structured interviews (individual and group), and territorial mapping exercises, all designed to identify the impacts of migration on self-governance, farming, forest use, and other forms of local environmental practice and knowledge. Field data was collected in Analco and Comaltepec during the period 2007-2010, and in Analco, Comaltepec, Yavesia, Maninaltepec (see also Gutierrez Estrada 2011) and Tepetotutla during the period 2013-2016. Study participants included communal authorities and residents living in the five communities in Oaxaca, and migrants from these communities residing in Oaxaca City, Mexico City, Los Angeles, Las Vegas, and Chicago. Table 2 provides the number of households surveyed and interviews conducted in the five communities across the two target populations of residents and non-residents (migrants).

In Analco and Comaltepec, households were surveyed by means of a concentric sampling technique that ensured representation across central, intermediate and peripheral urban zones; an appropriate method given the socio-economic divisions that exist in highland settlements in Oaxaca (with poorer households generally located on the edge of villages). Respondents were asked specific questions about the area of land under cultivation today compared to 5, 10, and 20 years ago, crop varieties grown today and in the past, and other changes in contemporary vs. traditional resource practice. They were also asked questions about migration dynamics, participation in community self-governing practices, and remittance trends within the family. In the case of Comaltepec, detailed remittance data was also available through an agency in the community that had been set up to receive monies from family members in the USA. In addition to household data, semi-structured interviews were conducted with resident community members, including land users, and with communal authorities. In Tepetotutla and Maninaltepec, interviews were strategically selected to include communal authorities and informants with varying experiences of migration.

In Comaltepec and Analco, ecological and land use data were collected through forest transects in tropical dry, dry oak, mixed pine-oak and cloud forests, and territorial walking tours across extensive areas of current and former farmed lands (more details in Robson, 2010). Walking tours (see Figs S1 and S2) were used as a specific method for mapping areas of agricultural abandonment and new forest growth. Based upon prior discussions with land users and the communal authorities, we identified areas around each village that were no longer used for farming and had been left for pasture or natural regeneration. Local land users would accompany us on these walking tours, where abandoned plots would be marked by GPS and a history of land use (year of, and reason for abandonment) as well as current status and condition (use and vegetation type) noted. In Tepetotutla and Maninaltpec, questions concerning land use and land cover change were included in interview guides. For the communal territories of Comaltepec, Analco, and Tepetotutla, these field-based observations of change in land use were supplemented by comparing aerial photographs and LANDSAT imagery (INEGI databases) for the period 1990-2015 with what we could observe in the field and discuss with our informants.

For research interactions with migrants, extended fieldwork in the communities of origin were essential for securing letters of introduction from village authorities, by which contact with migrant organizations and their members was made possible. Other migrants were contacted through ties the researchers forged with family members in the community of origin. Both strategies proved crucial for establishing contact and trust with migrants in the US, many of whom remain undocumented. Nearly all interviewees were first-generation migrants: born in the home village, but who left as children or young adults to pursue wage labour or educational opportunities elsewhere. Most were long-term absentees, having spent at least 15 years and in some cases as many as 55 years living outside the home village. This included the majority of migrants in the USA, around three-quarters of whom remain undocumented.

All interviews were either audio-recorded or jot-noted and transcribed shortly thereafter. Transcriptions were coded through a process that allowed themes to be read across interviews, for associations to be identified between such themes, and for insights to be refined based on those relationships (Bernard 2017). For the purpose of maintaining anonymity, direct quotes used in this manuscript are not credited to identifiable individuals.

Finally, it should be noted that Santiago Comaltepec is the one community with multiple localities (the head village of Comaltepec, and two smaller settlements of La Esperanza and San Martin Soyolapam). Our analysis takes accounts of this by including interviews and household surveys from those locations.