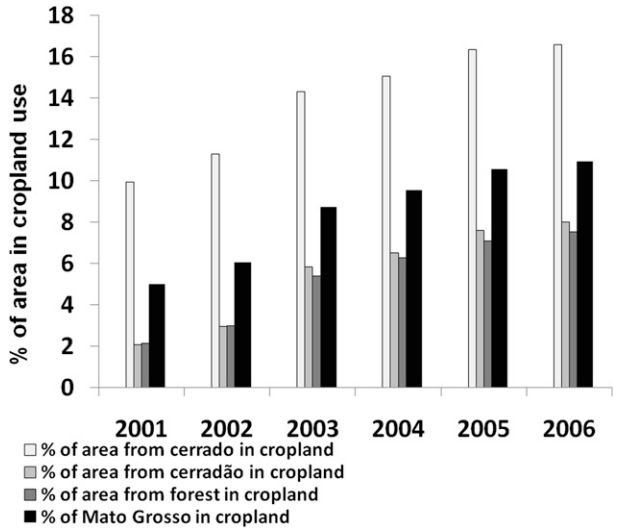

Figure 4. The percentage of land in cropland use in each originating biome and for the entire state.

3.2.2. Double-cropping intensification

Double cropping increased significantly over the period 2001–06, occurring on less than 2% (15 991 km^2) of Mato Grosso in 2001 and 4.25% (39 359 km^2) of the state by 2006. Averaged over the study period, double cropping accounts for 40% of all croplands but is not uniformly distributed across the natural ecosystems (Figure 7).

Rates of conversion to double cropping vary by source land cover and land use (Figure 8). By biome, cerrado has the largest overall level of double-cropping intensification, with double-cropping patterns at almost 50% of all croplands (Figure 8). Double-cropping patterns account for an annual average of 47% of cerrado croplands, increasing their share of the cerrado land cover from 4% to 8% over the study period. Cerradão and forest both have double-cropping patterns in less than half the cropland area. In the cerradão system, double-cropping rates as a percentage of all cropland area in cerradão ranged from a low of 18% in 2003 to a high of 30% in 2004. Double cropping increased over threefold during the study period in the forested region, ending with 3% double-cropping land use.

3.3. Estimated greenhouse gas emissions

We estimate an annual average of 179 Tg CO_2-e yr^{-1} emissions from cropland extensification in Mato Grosso (Figure 9), with forest-to-cropland transitions having the highest carbon emissions at 126 Tg yr^{-1} CO_2-e. In forest-to-cropland transitions, methane emissions average 12 Tg CO_2-e yr^{-1} from forest biomass burning. Cerrado-to-crop, cerradão-to-crop, and pasture-to-crop transitions have modest emissions (17, 16, and 21 Tg CO_2-e yr^{-1}, respectively). Emissions from