

Appendix 2. R code to compute Coefficient of Areal Correspondence (CAC) with toy examples for overlapping, non-overlapping and perfectly overlapping polygons.

```
library(sf)
library(tidyverse)

# Create sf collections of toy polygons
createSquarePolygons <- function(x, a) { #define function to create square
polygons
  a <- sqrt(a)/2
  return( sf::st_buffer(x, dist = a, nQuadSegs=1, endCapStyle = "SQUARE") )}
overlappingPolygons <- createSquarePolygons(st_as_sf(data.frame(x = c(1,1), y
= c(1,1.5)),coords = c("x", "y")), 1)
nonOverlappingPolygons <- createSquarePolygons(st_as_sf(data.frame(x =
c(1,1), y = c(1,2)),coords = c("x", "y")), 1)
perfectlyOverlappingPolygons <- createSquarePolygons(st_as_sf(data.frame(x =
c(1,1), y = c(1,1)),coords = c("x", "y")), 1)

# Plot toy polygons
plot(overlappingPolygons)
plot(nonOverlappingPolygons)
plot(perfectlyOverlappingPolygons)

# Compute CAC for toy polygons
polygons <- overlappingPolygons #define input polygons
intersect <- polygons %>%
  st_set_precision(1e5) %>%
  st_make_valid() %>%
  st_intersection() %>%
  dplyr::mutate(area=st_area(geometry)) %>%
  select(n.overlaps,area) %>%
  st_drop_geometry
intersect <- rbind(intersect,data.frame(n.overlaps=2,area=0)) #add overlap
row for cases without overlap
intersect <- rbind(intersect,data.frame(n.overlaps=1,area=0)) #add nonoverlap
row for cases with perfect overlap
intersect$overlap[intersect$n.overlap==1] <- "nonoverlaps" #identify
nonoverlaps
intersect$overlap[intersect$n.overlap>1] <- "overlaps" #identify overlaps
intersect_c <-reshape2::dcast(intersect, .~overlap,value.var="area",sum)
#compute sum of overlaps and nonoverlaps
intersect_c$CAC <-
intersect_c$overlaps/(intersect_c$overlaps+intersect_c$nonoverlaps) #compute
CAC
intersect_c$CAC #print CAC
```