Part I
Handling Spatial Data in R

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The key intuition underlying the development of the classes and methods in the **sp** package, and its closer dependent packages, is that users approaching R with experience of GIS will want to see 'layers', 'coverages', 'rasters', or 'geometries'. Seen from this point of view, **sp** classes should be reasonably familiar, appearing to be well-known data models. On the other hand, for statistician users of R, 'everything' is a `data.frame`, a rectangular table with rows of observations on columns of variables. To permit the two disparate groups of users to play together happily, classes have grown that look like GIS data models to GIS and other spatial data people, and look and behave like data frames from the point of view of applied statisticians and other data analysts.

This part of the book describes the classes and methods of the **sp** package, and in doing so also provides a practical guide to the internal structure of many GIS data models, as R permits the user to get as close as desired to the data. However, users will not often need to know more than that of Chap. 4 to read in their data and start work. Visualisation is covered in Chap. 3, and so a statistician receiving a well-organised set of data from a collaborator may even be able to start making maps in two lines of code, one to read the data and one to plot the variable of interest using lattice graphics. Note that complete code examples, data sets, and other support material may be found on the book website.

If life was always so convenient, this part of the book could be much shorter than it is. But combining spatial data from different sources often means that much more insight is needed into the data models involved. The data models themselves are described in Chap. 2, and methods for handling and combining them are covered in Chap. 5, with substantial discussion of functions and operations provided in the **rgeos** package. Keeping track of which observation belongs to which geometry is also discussed here, seen from the GIS side as feature identifiers, and row names from the data frame side. In addition to

data import and export, Chap. 4 also describes the use and transformation of coordinate reference systems for **sp** classes, and integration of the open source GRASS GIS and R. Finally, Chap. 6 explains how the methods and classes introduced in Chap. 2 can be extended to spatio-temporal data.