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Harrison, Laura Jane orcid.org/0000-0003-3923-7083, Cowie, Catherine Elizabeth, Clarke, Emma et al. (2 more authors) (2025) A toolkit for the use of mapping tools to consider opportunities for health and nature recovery. University of York, York, UK.

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# Beyond data tools: Generating maps in a Geographic Information System (GIS) to bring together information relating to health and nature

March 2025 Appendix 4 of: Harrison, LJ; Cowie, CE; Clarke, E; Smith, E; White, PCL 2025 A toolkit for the use of mapping tools to consider opportunities for health and nature recovery. Project report and toolkit.

## The benefits of using a GIS

As shown in <u>this toolkit</u>, there are numerous data tools available showing mapped information about various. They can provide users with valuable information about their area of interest and help to identify locations where improvements could be made for both health and nature. In order to explore those locations in greater detail and start to work towards the realisation of potential improvements, it may be necessary to assemble the various datasets of interest in the same mapping system within a Geographical Information System (GIS). This allows the user to view the relevant layers in detail on the same map, and provides the opportunity to share maps with others and to print them for viewing by multiple participants in a workshop or other meeting. Printing the maps provides the particular advantage of allowing users to annotate the map, facilitating detailed local knowledge exchange.

## Things to consider about using a GIS

## Has this mapping already been completed in your area?

Before compiling maps yourself, it is worth considering if any organisations operating in your area of interest might have already created relevant maps, or might be able to share a compilation of relevant map layers. For example, in England, habitat maps will be produced in each of the Local Nature Recovery Strategy (LNRS) areas. You could contact the team developing the LNRS in the relevant area(s) to check what mapping work has already been done and how strategies to support nature recovery are being developed. This is an opportunity to ensure your work is well aligned with local objectives and to identify any potential organisations to work with in partnership.

## Using GIS: access and expertise

Various GIS software programmes are available to use, with the most popular being Quantum GIS (QGIS) and ArcGIS Pro. <u>QGIS</u> is an open access (free to use) software that can be easily adapted with additional plugins to conduct detailed spatial data presentation and analysis. <u>ArcGIS</u> <u>Pro</u> is licensed software (individual licence subscriptions start at £1000/year, at the time of writing) with all tools built into the programme. Both programmes provide useful video tutorials, written guidance and extensive forums to seek advice from other users. However, in order to



have the skills to make full use of these resources it is recommended that you have some initial training in the use of GIS software. Courses are available online and/or from various universities in the UK and abroad. The cost and time required for these courses varies, and needs to be factored into resourcing allocations to deliver GIS maps if your team doesn't have previous GIS experience.

## Access to data layers

Once you have access to a GIS, the next stage to create a map is to access data layers. Data layers can be downloaded from online data portals. The publicly available data tools described elsewhere in this project show which datasets exist, and may link to where they can be

downloaded. Key sources on a national level include the Government's <u>open geography portal</u>, the Natural England <u>open data geoportal</u>, the Ordnance Survey <u>data portal</u>, and the Office for National Statistics <u>geoportal</u>. More locally, local authorities often have data sharing portals, and datasets can also be retrieved using a freedom of information request. Furthermore, consulting with colleagues or partners in your network can help to identify projects or activities in your area of interest that might provide spatially explicit data.

To create layers relating to health, one additional consideration is that some publicly available datasets provide summary data at the Ward, Middle Super Output Area (MSOA) or Lower Super Output Area (LSOA) level. Although these data may be shared in spreadsheets, they can be 'joined' to spatial data of the boundaries of those areas. The boundaries are freely available from the <u>Office for National Statistics</u>. Data you could map in this way include the <u>Index of Multiple</u> <u>Deprivation</u>, Age UK's dataset on <u>Ioneliness in people aged over 65</u>, and Sport England's dataset on <u>adult inactivity levels</u>. The NHS <u>data sharing website</u> is updated regularly and may also contain datasets that could be joined to spatial boundaries in this way.

## Data presentation

Once you have access to the data you require, the next step is to present the data layers together in one map. As many layers will overlap with each other, it is important to consider the presentation carefully. It may be necessary to change the colour, symbols, outline, pattern or transparency of a layer to ensure it is distinguishable from each other layer. To maintain good accessibility, colour choices should be made with consideration of the impacts of <u>colour</u> <u>blindness</u>. Certain layers may have different features that you wish to present in different shades or colours. For example, there are different categories of flood risk presented in the Environment Agency's <u>risk of flooding from rivers and seas</u> dataset. The limit to the number of datasets that can be presented concurrently is highly dependent on the scale, location and choice of datasets, but needs to be considered as datasets are gathered to ensure the key data are presented.



# 'Identifying priority areas for health and nature' project workshop example

In the 'Identifying priority areas for health and nature' project conducted in Bradford, a GIS was used to create maps that were shared during a workshop with local stakeholders in health and nature. The maps showed data layers of health infrastructure, green and blue infrastructure and areas of importance for biodiversity, as well as the OpenStreetMap base map (see table below).

Data type	Dataset	Data description	Source
Health Infrastructure	<ul> <li>NHS Clinical Commissioning Group (CCG) boundaries</li> <li>Medical sites</li> </ul>	Linear boundaries of all CCGs in England were presented. The point locations of the hospital sites were also shown, though the age and accuracy of these data are unclear.	Office for National Statistics (CCG boundaries) OpenStreetMap (Humanitarian maps) (Free login required).
Green Infrastructure	<ul> <li>Access land (Countryside and Rights of Way Act 2000)</li> <li>Allotments and community growing spaces</li> <li>Cemeteries and religious grounds</li> <li>Golf courses</li> <li>Millennium or Doorstep greens</li> <li>Other sports facilities</li> <li>Play space provision</li> <li>Public parks (General and Country Parks)</li> <li>Woodland</li> </ul>	The land cover of each of these types of green infrastructure has been assessed by Natural England and was presented using a different colour (and sometimes pattern) so that each of these elements could be differentiated using the legend provided.	<u>Natural England's</u> <u>Green and Blue</u> <u>Infrastructure</u> <u>Geodatabase</u>
Blue Infrastructure	<ul> <li>Rivers</li> <li>Canals</li> <li>Surface waters (including streams, lakes and ponds)</li> </ul>	The lines of the linear features (rivers and canals) and the land cover of as been assessed by Natural England and was presented using different shades of blue so that each of these elements could be differentiated using the legend provided.	Natural England's Green and Blue Infrastructure Geodatabase
Areas of importance for biodiversity	<ul> <li><u>Sites of special scientific interest</u></li> <li><u>Ancient woodland</u></li> <li><u>Local nature reserves</u></li> <li><u>National nature reserves</u></li> </ul>	The land cover of each of these areas has been recorded by Natural England and was presented using a different colour for each so that each of these elements could be differentiated using the legend provided.	Natural England Open Data (individual links given to left)
Basemap	OpenStreetMap	A base map (as viewable online) showing the location of buildings, the transport network and key environmental features as well as road and place names.	OpenStreetMap (often pre-loaded as a base map option in GIS software)



The maps were produced on three different scales, as appropriate for the three different CCGs in the Bradford area (see example of the map produced for the Bradford City CCG below).





These maps were printed at A1 size, allowing for easy viewing by multiple workshop participants at once, and providing the opportunity to undertake participatory mapping exercises by drawing, writing or sticking notes onto the map. In the example below, participants at the project workshop used sticky notes to share the names and locations of current and potential future project partners in the wider Bradford district area. This information could then be digitised in a GIS system to allow the results to be shared with workshop participants and other stakeholders.

