

FORMAT		
1. Name of resource	Understanding the users and uses of UK Natural History Collections	
2. Location	https://riojournal.com/article/113378/element/4/10493687//	
3. Alternative location		
4. Author[s]	H. Hardy and others	
5. Publisher/producer/host	Research Ideas and Outcomes	
6. Year	2023	
7. Suggested citation	Hardy H., Livermore L., Kersey P., Norris K. and V.S. Smith (2023). Understanding the users and uses of UK Natural History Collections. Research Ideas and Outcomes 9: e113378. https://doi.org/10.3897/rio.9.e113378	
8. Languages in which available	English	
9. Geographic area resource relates to	UK but with global relevance	
10. Does the resource relate to a specific time frame?		
11. Type	Report	Yes
	Toolkit/Framework/Roadmap	
	Sign-post to other resource (database)	Yes
	Case studies	
	Other	
12. Part of an initiative?		
COLLECTIONS AND COLLECTIONS-BASED INSTITUTIONS		
13. Explicit links to collections	Yes	
14. Explicit links to museums/libraries/archives	Yes	
15. Types of institutions relevant to	Museums	X
	Archives	X
	Libraries	X
	Other	X
16. Does the resource relate to specific disciplines?	Arts, humanities and social sciences: philosophy, psychology, religion, social sciences, law, politics, language, arts and recreation, architecture, literature, history,	X

	geography and ethnology, anthropology, archaeology	
	Science, natural history, technology, medicine, engineering, manufacturing	X
17. If no explicit links to collections, justification for inclusion		
HOW IT CONTRIBUTES TO SUSTAINABLE DEVELOPMENT		
18. Collections-related activities the resource relates to (mark all that apply)		
Develop collections to protect and safeguard wider cultural and natural heritage more effectively , for example by targeting collecting to threatened forms of heritage in strategic ways		
Use collections to promote learning and educational opportunities that contribute to sustainable development more effectively , for example education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development and/or skills development relating to collections		
Use collections to promote cultural participation/social inclusion more effectively , for example by reducing barriers to participation, to ensure no-one is 'left behind'		
Use collections to promote sustainable tourism more effectively , for example by developing new products based on local cultural heritage, and/or considering the rights of stakeholder groups in relation to collections		
Use collections to support research that contributes to sustainable development (including all forms of personal and self-directed research at all levels that make use of stored collections) more effectively, for example by providing effective facilities, collections and information to meet researchers' needs		X
Make decisions around collections that contribute to sustainable development more effectively		
i. employment (recruiting, staff training, staff safety)		
ii. energy consumption, greenhouse gas emissions, reduction, monitoring and reporting		
iii. waste management and reduction of waste		
iv. transport (forms of transport, energy use)		
v. commercial activities including copyright and IP		
vi. governance and management		
vii. security, disaster preparedness and risk reduction		

Direct external leadership, partnerships and collaborations towards sustainable development more effectively , for example by developing impactful partnerships	X
19. Does the resource relate clearly to any international conventions (mark all that apply)?	
Culture conventions:	
1952, 71 Protection of Copyright and Neighbouring Rights	X
1954 Protection of Cultural Property in the Event of Armed Conflict	
1970 Fighting Against the Illicit Trafficking of Cultural Property	
1972 Protection of the World Cultural and Natural Heritage	
2001 Protection of the Underwater Cultural Heritage	
2003 Safeguarding of the Intangible Cultural Heritage	
2005 Protection and Promotion of the Diversity of Cultural Expressions	
Rio Conventions:	
Convention on Biological Diversity (CBD), Convention to Combat Desertification (UNCCD), Framework Convention on Climate Change (UNFCCC)	X
AIMS AND CONTENT	
20. What issues does the resource aim to address?	“UK natural science collections hold over 137 million items, an unrivalled source of data about 4.56 billion years of planetary development and hundreds of years of biological change, including the differences made by humans — but the scientific, commercial, and societal benefits of these collections are constrained by the limits of physical access, and by highly fragmented digitisation efforts with less than 10% digitally available. Following work with Frontier Economics in 2021, which showed potential for £2 billion in benefits to the UK economy from digitising all UK natural science collections, in 2022–23 the Natural History Museum London worked, with analytical support from McKinsey and Company, to understand the impact of what has already been digitised and shared by UK natural science collections — what is the demand for these data, what are they used for, and how does this deliver efficient, effective and impactful research?”
21. Intended audience of resource	[Research community, policy makers, museum workers]
22. Process of development	
23. Organisation/structure/contents	<ol style="list-style-type: none"> 1. Introduction <ol style="list-style-type: none"> 1.1 Key insights 1.2 Project context 2. Methodology <ol style="list-style-type: none"> 2.1 Selection of relevant institutions 2.2 Sources for quantitative data 2.3 Sources for qualitative insights

	2.4 Data analysis 3. Results 3.1 UK institutional data representation in GBIF 3.2 Usage of UK collections data 3.3 Value and benefits to research 4. Discussion
FRAMEWORKS	
24. Framework structure	
25. Relevant policy considerations	Yes
26. Resources for implementation identified	Yes
27. Specific assessment points/indicators/milestones/action plan for monitoring	Yes
28. ASPECTS OF SUSTAINABILITY COVERED BY RESOURCE (mark all that apply)	
People (social sustainability)	X
Planet (environmental sustainability)	X
Prosperity (economic sustainability)	X
Peace	
Partnerships	X
29. CROSS-CUTTING CONSIDERATIONS COVERED BY RESOURCE (mark all that apply)	
Gender perspectives	
North and South perspectives	X
HOW THE RESOURCE CONTRIBUTES TO AGENDA 2030 AND THE SDGs	
HOW AGENDA 2030 AND THE SDGs FEATURE IN THE RESOURCE	
30. SDGs and Agenda 2030 specifically mentioned?	Yes
31. SDGs specifically mentioned?	Yes
32. SDG targets specifically mentioned?	No
33. SDG indicators specifically mentioned?	No
SDGs AND SDG TARGETS AND LINKAGES	

<p>34. Comments on SDG linkages</p>	<p>The resource can support SDG targets relating to research, access to information, and sustainable and effective infrastructures, including 2.5 (preserving crop diversity), 4.7 (Education for Sustainable Development), 9.1 (sustainable infrastructure), 9.5 (support for science), 9.B (support for science in developing countries), 11.4 (strengthen efforts to protect and safeguard cultural and natural heritage), 12.8 (access to information for sustainable development and lifestyles in harmony with nature), 13.3 (climate action), 15.1 (preserving habitats), 15.5 (preventing loss of biodiversity), 15.6 (fair sharing of use of genetic resources and related knowledge), 15.8 (managing invasive species), 16.10 (access to information), 16.B (support laws and policies for sustainable development), 17.6 (international co-operation for science), 17.16 and 17.17 (international and cross-sector partnerships), and 17.19 (measures for sustainable development beyond GDP).</p>
<p>35. SDGs and SDG targets the resource helps advance</p>	
<p>SDG 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture 2.5 By 2020, maintain the genetic diversity of seeds, cultivated plants and farmed and domesticated animals and their related wild species, including through soundly managed and diversified seed and plant banks at the national, regional and international levels, and promote access to and fair and equitable sharing of benefits arising from the utilization of genetic resources and associated traditional knowledge, as internationally agreed</p>	<p>Collections development related to genetic diversity of seeds, cultivated plants, farmed and domesticated animals (notably of local or at-risk varieties) and related wild species, for example in herbaria, museums, seed and gene banks, and seed libraries.</p> <p>Number of educational programmes related to genetic diversity of domesticated plants, animals and wild relatives.</p> <p>Number of educational programmes related to fair and equitable benefits of use of genetic resources and associated traditional knowledge, following international agreements (e.g. Nagoya Protocol).</p> <p>Number of educational and awareness programmes for people to ensure that they are aware of their rights and protections in terms of traditional knowledge, and exploitation of genetic resources.</p> <p>Number of research activities that help understand traditional knowledge, and genetic diversity of crop plants and animals.</p> <p>Ensure that producers of crop plants and animals are fairly compensated.</p> <p>Policies and procedures in place to ensure legal compliance with fair and equitable benefits of use of genetic resources</p>

	<p>and associated traditional knowledge, following international agreements (e.g. Nagoya Protocol).</p> <p>Number of partnerships at national, regional and international levels, as appropriate, to soundly manage seed and plant banks.</p>
<p>SDG 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all</p> <p>4.7 By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development</p>	<p>Numbers of people in each type of programme drawing on collections from different demographic groups.</p> <p>Increases in numbers of people in each type of programme from different demographic groups.</p> <p>Proportion of people involved in such programmes in relation to overall audience size.</p> <p>Evidence that learners have acquired knowledge and skills to promote sustainable development.</p>
<p>SDG 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation</p> <p>9.1 Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all</p>	<p>Development of research-useful collections to support reliable, sustainable and resilient use by researchers and others.</p> <p>Number and proportion of collections facilities and stores that support economic development and human well-being.</p> <p>Number and proportion of collections facilities and stores that provide affordable and equitable access for all.</p> <p>Investment in collections facilities.</p> <p>Inclusion of collections information in regional and transborder initiatives, notably via digital access for discoverability.</p>

<p>SDG 9. Build resilient infrastructure, promote inclusive and sustainable industrialization</p> <p>9.5 Enhance scientific research, upgrade the technological capabilities of industrial sectors in all countries, in particular developing countries, including, by 2030, encouraging innovation and substantially increasing the number of research and development workers per 1 million people and public and private research and development spending</p>	<p>Number and proportion of collections facilities that effectively support research and researchers.</p> <p>Number and proportion of staff who are appropriately skilled to undertake and support collections-based research.</p> <p>Expenditure on initiatives to enhance and upgrade collections facilities.</p> <p>Numbers of staff engaged in supporting and developing research use based on collections.</p> <p>Number of initiatives to encourage innovation drawing on collections.</p> <p>Increase in number of research and development workers per 1 million people.</p> <p>Increase in public and private research and development spending being used to develop and make use of collections.</p>
<p>SDG 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation</p> <p>9.B Support domestic technology development, research and innovation in developing countries, including by ensuring a conducive policy environment for, inter alia, industrial diversification and value addition to commodities</p>	<p>Support for domestic technology development, research and innovation in developing countries, through e.g. supporting effective policies, and development of services and products, through knowledge-sharing, research and partnerships.</p>
<p>SDG 11. Make cities and human settlements inclusive, safe, resilient and sustainable</p> <p>11.4 Strengthen efforts to protect and safeguard the world's cultural and natural heritage</p>	<p><i>11.4.1 Total expenditure (public and private) per capita spent on the preservation, protection and conservation of all cultural and natural heritage, by type of heritage</i></p> <p>Plans, policies and procedures in place for the safe use of collections for a variety of purposes, protecting and safeguarding both collections and those who use them.</p>

	<p>Plans, policies and procedures in place for the identification, safeguarding and protection of cultural and natural heritage at risk.</p> <p>Collecting programmes in place to protect, safeguard and make use of cultural and natural heritage, addressing the needs of communities and stakeholders, and ensuring that collections can be an effective resource for sustainable development.</p> <p>Number and diversity of educational, awareness-raising, research programmes, and partnerships that aim to strengthen protection of cultural and natural heritage.</p>
<p>SDG 12 Ensure sustainable consumption and production patterns 12.8 By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature</p>	<p><i>12.8.1 Extent to which (i) global citizenship education and (ii) education for sustainable development (including climate change education) are mainstreamed in (a) national education policies; (b) curricula; (c) teacher education; and (d) student assessment</i></p> <p>Extent to which global citizenship education and education for sustainable development (including climate change education) are mainstreamed in formal, informal and non-formal education programmes and activities drawing on and related to collections.</p>
<p>SDG 13. Take urgent action to combat climate change and its impacts 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning</p>	<p>Plans in place to enhance positive contributions to addressing climate change through use of collections. Plans in place to ensure collections, collections institutions and broader society can adapt effectively to climate change.</p> <p>Plans in place for effective education and awareness raising on climate change mitigation, adaptation, impact reduction and early warning.</p> <p>Plans in place to reduce negative contributions of collections-related functions, e.g. measuring greenhouse emissions with plans and targets in place to reduce them.</p>
<p>SDG 15 Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land</p>	<p>Proportion of terrestrial and freshwater ecosystems in a good ecological condition.</p> <p>Information on, educational programmes, collections development, research and partnerships relating to</p>

<p>degradation and halt biodiversity loss 15.1 By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements</p>	<p>terrestrial and freshwater ecosystems drawing on collections in place.</p> <p>Policies relating to collections and their use aligned with international agreements for conservation and sustainable use of biodiversity.</p>
<p>SDG 15 Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss 15.5 Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species</p>	<p>Number and proportion of habitats, notably endangered habitats, and species with favourable conservation status, with special reference to locally, nationally and globally endangered species.</p> <p>Information on, programmes relating to, collections development, and partnerships relating to habitats and species drawing on collections in place, to support their protection and continued existence.</p> <p>Measures taken to enhance biodiversity value of green space associated with collections institutions.</p>
<p>SDG 15 Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss 15.6 Promote fair and equitable sharing of the benefits arising from the utilization of genetic resources and promote appropriate access to such resources, as internationally agreed</p>	<p>Policies, plans and agreements in place for access and benefit sharing relating to use of collections, in line with the Nagoya Protocol (notably relating to natural history collections, gene banks, tissue banks, seed banks).</p> <p>Effective communication and dissemination methods in place to promote access to resources, and access to relevant policies, plans and agreements, in place.</p>

<p>SDG 15 Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss</p> <p>15.8 By 2020, introduce measures to prevent the introduction and significantly reduce the impact of invasive alien species on land and water ecosystems and control or eradicate the priority species</p>	<p>Number and proportion of invasive alien species for which effective measures are in place to reduce their impact on land and water ecosystems.</p> <p>Information on, programmes relating to, collections development, and partnerships relating to invasive alien species, to support their effective management, and to prevent spread and impact.</p>
<p>SDG 16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels.</p> <p>16.10 Ensure public access to information and protect fundamental freedoms, in accordance with national legislation and international agreements</p>	<p>Adopt and implement constitutional, statutory and/or policy guarantees for public access to information.</p> <p>Plans in place, and plans implemented to enhance public access to information relating to collections.</p> <p>Plans in place, and plans implemented to support fundamental freedoms, in line with human rights, national and international agreements and legislation.</p> <p>Plans and procedures in place for public access to information relating to the operation and management of collections-based institutions.</p> <p>Complaint mechanism in place for public to use where public access to information and fundamental freedoms not supported or fulfilled.</p>
<p>SDG 16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels.</p> <p>16.B Promote and enforce non-discriminatory laws</p>	<p><i>16.B.1 Proportion of population [audience/users/non-users] reporting having personally felt discriminated against or harassed in the previous 12 months on the basis of a ground of discrimination prohibited under international human rights law</i></p> <p>Number and proportion of policies that incorporate sustainable development considerations, in the full sense of</p>

<p>and policies for sustainable development</p>	<p>recognizing all three of social, economic and environmental considerations.</p>
<p>SDG 17. Partnerships for the goals 17.6 Enhance North-South, South-South and triangular regional and international cooperation on and access to science, technology and innovation and enhance knowledge-sharing on mutually agreed terms, including through improved coordination among existing mechanisms, in particular at the United Nations level, and through a global technology facilitation mechanism</p>	<p>Number and diversity of North-South, South-South and triangular co-operations and projects to support access to science, technology and innovation and enhance knowledge-sharing on mutually agreed terms.</p>
<p>SDG 17. Partnerships for the goals 17.16 Enhance the global partnership for sustainable development, complemented by multi-stakeholder partnerships that mobilize and share knowledge, expertise, technology and financial resources, to support the achievement of the sustainable development goals in all countries, in particular developing countries</p>	<p>Number and/or increase in number, and diversity of global and international multi-stakeholder partnerships that share collection-related knowledge, expertise, technology and financial resources to address the SDGs, or that otherwise involve collections-based organisations and institutions.</p> <p>Number and/or increase in number, and diversity of global and international multi-stakeholder partnerships involving developing countries that share collection-related knowledge, expertise, technology and financial resources to address the SDGs.</p>
<p>SDG 17. Partnerships for the goals 17.17 Encourage and promote effective public, public-private and civil society partnerships, building on the experience and resourcing strategies of partnerships</p>	<p><i>17.17.1 Amount of United States dollars committed to public-private and civil society partnerships</i></p> <p>Number and/or increase in number, and diversity of local, national and regional multi-stakeholder (public, public-private and civil society) partnerships that address the SDGs drawing on collections, or that otherwise involve collections-based organisations and institutions.</p>

SDG 17. Partnerships for the goals		Identification and implementation of measures for sustainable development incorporating social and environmental considerations.			
17.19 By 2030, build on existing initiatives to develop measurements of progress on sustainable development that complement gross domestic product, and support statistical capacity-building in developing countries		Identification and implementation of both quantitative and qualitative measures of sustainable development.			
1	2	3	4	5	6
7	8	9	10	11	12
13	14	15	16	17	