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Institut für angewandte Ökologie
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Nuclear cultural heritage in the context of long-term nuclear waste governance

Dr. Melanie Mbah, Dr. Viktoria Noka, Alexandra Lampke, Christian Nissen | Amsterdam, 16.07.2024

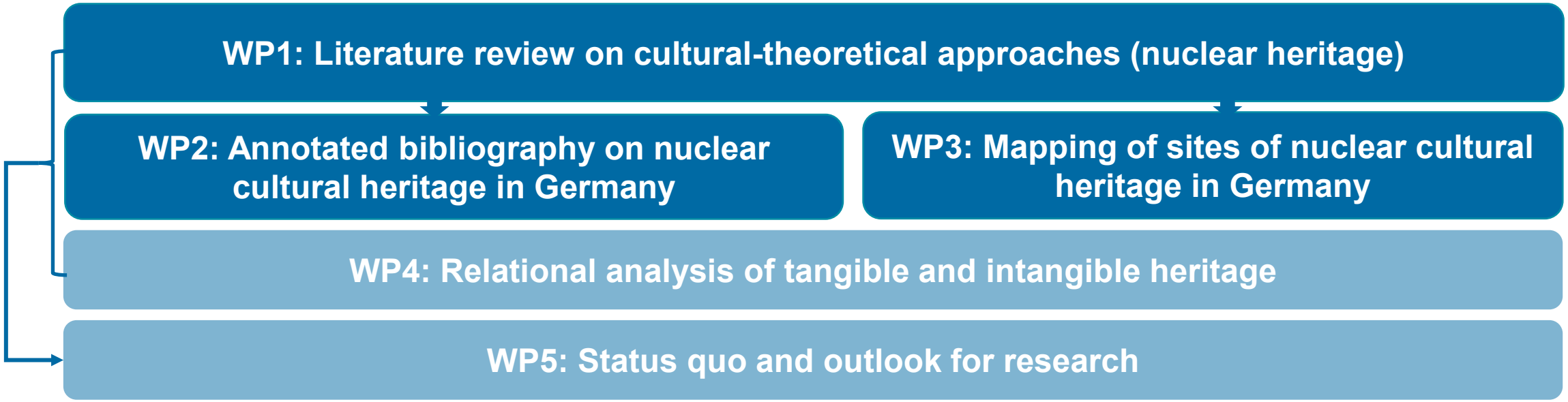
Context: nuclear waste governance (in Germany)

- Highly radioactive waste as an **eternal burden** (Brunnengräber 2015)
- The site selection procedure (StandAG) should be transparent, participatory, learning, self-questioning and science-based to **promote the acceptability** and ensure ‘added value’ of the site beyond its core function (NEA, 2022)
- During and after the site selection process, the construction and operating phase, and after closure, the **memory** of these processes must be **preserved**, to **guarantee safety** in dynamically changing contexts, and honor the region that takes on the burden (cf. Kuppler/Hocke 2019; Mbah/Kuppler 2021; Mbah/Kuppler 2024)
- An active nuclear cultural heritage can serve the **prevention of loss of knowledge** and **support decision-making processes** with regard to nuclear sites (Rindzevičiūtė, 2019)

Context: the project „Nuclear Cultural Heritage approaches and methods and their applicability in the context of the site selection procedure” (NuCultAge)

Contractor: Federal Office for the Safety of Nuclear Waste Management (BASE), Germany (4723F90101)

Duration: 02/2023 - 02/2025



Methodological approach

WP1

- **Systematic literature review**
- Focus on **international theoretical-conceptual** research literature
- Search strings, e.g. „nuclear & heritage“
- ~ 450 publications, ~ 340 thematically relevant

WP2

- **Annotated bibliography** of literature on nuclear cultural heritage at **national level**
- Systematic key word search via google, e.g. „uranium mining & heritage (pdf)“
- First 50 hits per key wod string, ~ 830 documents in total, 61 documents relevant

WP3

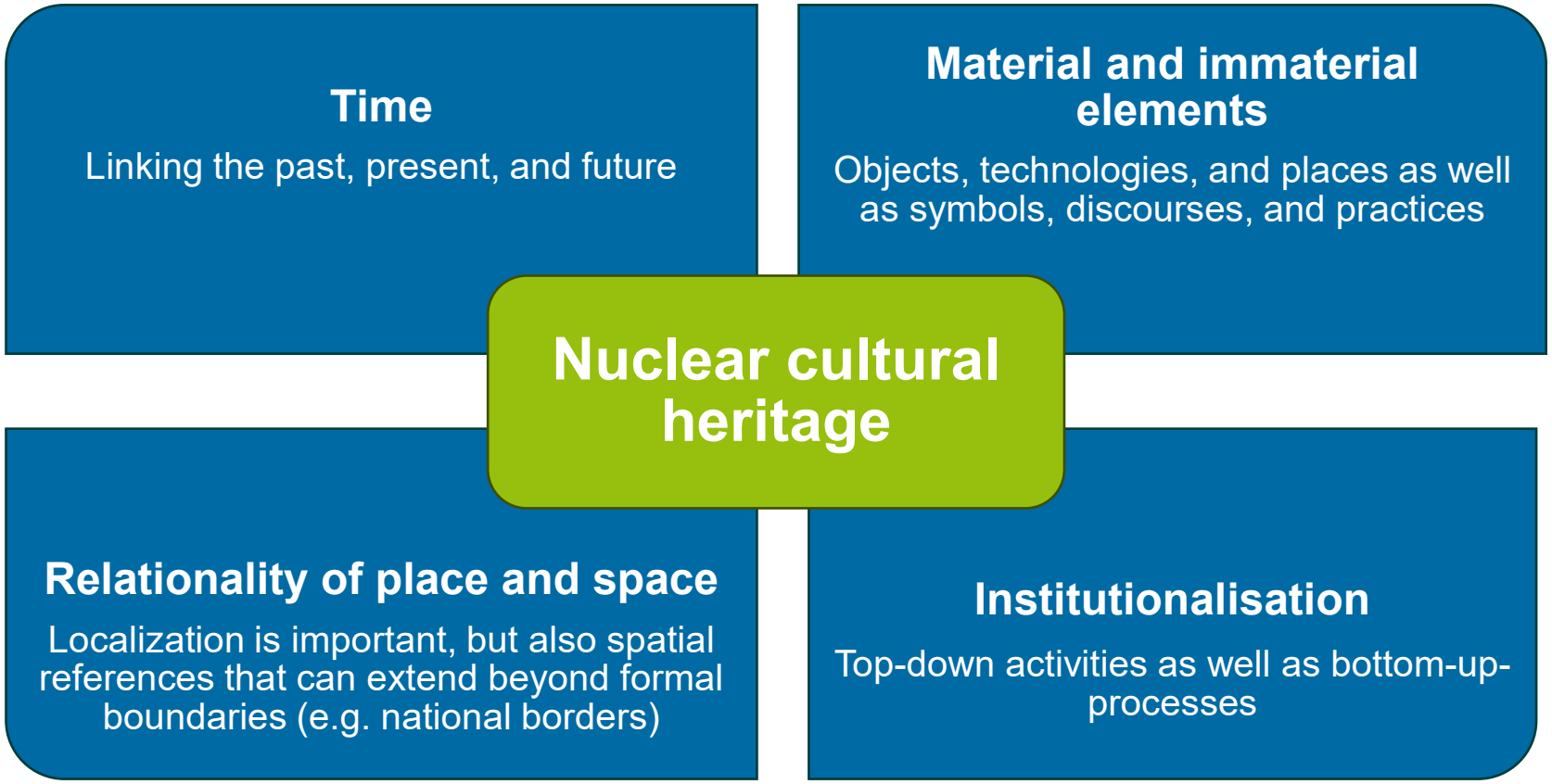
- **Mapping of places** at **national level**
- Identification based on WP1 and WP2 as well as existing data basis (e.g. Atommüllreport, Lobby Association Nuclear Technology Germany)

What is nuclear cultural heritage?

"Practices and artifacts of the nuclear past and present that are considered relevant and important for the future. The practices include identifying, collecting, preserving and communicating about nuclear artifacts and related social debates." (Mbah et al. in review)

- Nuclear cultural heritage is understood as an **active**, **dynamic** process.
- Nuclear cultural heritage does not arise by itself, but is **produced** by individuals or groups, so-called actors.
- Individuals and groups **act** to preserve nuclear objects, locations, and knowledge.

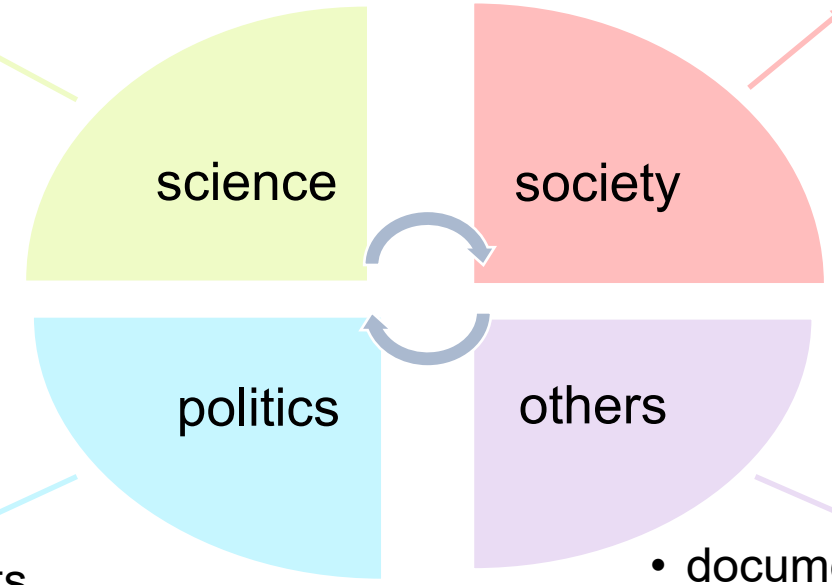
Four key aspects of nuclear cultural heritage



Actors and documents of nuclear cultural heritage in Germany

- journal articles
- books and
- contributions to such

- information materials
- stimulate discourse, debate and protest

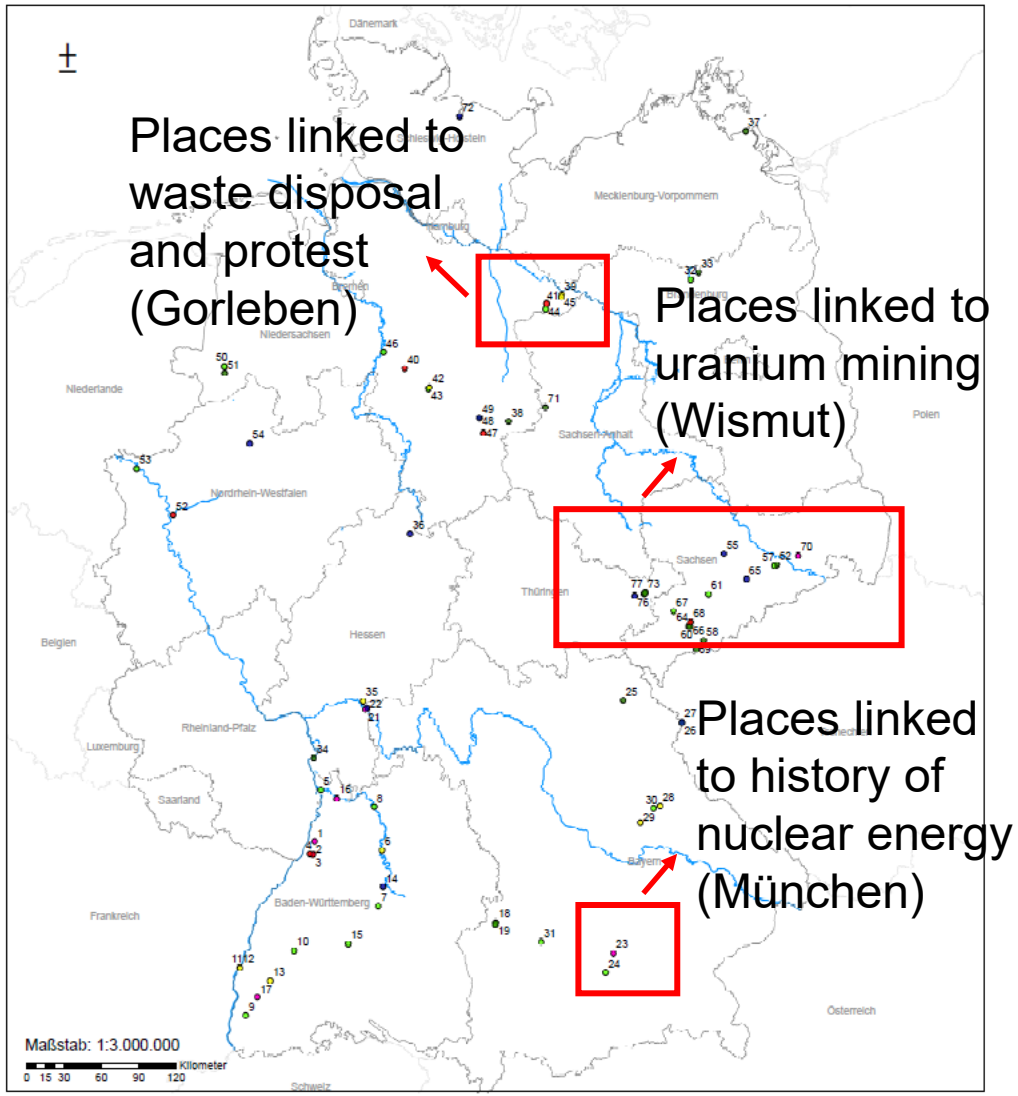


- expert reports

- documentations of events and exhibitions
- magazines or newsletters

Mapping of nuclear cultural heritage in Germany

Places of nuclear cultural heritage in Germany



Projekt:
Ansätze und Methoden des Nuclear Cultural Heritage und ihre Anwendbarkeit im Kontext des Standortauswahlverfahrens (FKZ 4722E03320)

Karte 01: Orte des Nuklearen Kulturellen Erbes in Deutschland

Legende

- Archiv
- Ausstellungsort
- Besucherzentrum
- Forschung
- Gedenkort
- Museum
- Wasserstraßen

ID	Titel/Name
01	Forschungsreaktor 2 (FR2)
02	Karlsruher Institut für Technologie
03	KIT Archiv
04	Landesarchiv Baden-Württemberg
05	Siemens Unterrichtsreaktor (SUR-KA)
06	Leinpfad am Neckar
07	„Leben in Neckarwestheim mit und ohne „GKN""
08	Bildergalerie KKW Obrigheim
09	Landesbergbaumuseum Sulzburg
10	MiMa - Museum für Mineralien und Mathematik
11	„NATO-Rampe" Wyhl
12	Gedenkstein an Tag der Bauplatz-besetzung „NAI HÄMMER GSAIT!"
13	Sasbacher Gedenkstein zum Widerstand gegen das AKW Wyhl
14	Ausstellung „Atom. Strom. Protest. 50 Jahre Wyhl und anderswo"
15	Atomkeller-Museum Haigerloch
16	Deutsches Krebsforschungszentrum
17	Öko-Institut e.V.
18	Info-Zentrum Rückbauanlage Gundremmingen
19	Ausstellung „1962 – 2022 Gundremmingen und die Kernenergie, 60 Jahre in einer 2000jährigen Gemeindegeschichte
20	Ehemaliger Standort AKW Kahl
21	Energiemuseum Karlstein
22	Plakat-Ausstellung „Fukushima, Tschernobyl und wir"
23	Atom-Ei/Heinz Maier-Leibnitz Zentrum
24	Deutsches Museum, München
25	Besucherbergwerk und Bergbaumuseum „Werra"
26	Ausstellung „Uran am Grenzkamm"
27	Veranstaltung „Radioaktivität zum Anfassen"
28	Franziskus-Marterl
29	Gedenkstein Anti-WAAhnsinns-Festival
30	Heimat- und Industriemuseum Wackersdorf
31	Ausstellung „Großprojekte in Bayern 1945-2024"
32	Ausstellung „3 x Uran"
33	Kernkraftwerk Rheinsberg
34	Informationszentrum Biblis
35	„Atomdorf" Hanau
36	Wanderausstellung „Nach der Kernkraft – Konversionen des Atomzeitalters"
37	Block 5
38	Infostelle Asse
39	Beluga Boot
40	Bildersammlung zu Gorleben
41	Gorleben Archiv
42	Gorleben-Gedenkstein
43	Ausstellung „Treck(er) nach Hannover. Gorleben und die Bewegung zum Atomausstieg"
44	Ausstellung „Gorleben sammeln"
45	Republik Freies Wendland
46	Ausstellung „40 Jahre „Schlacht um Grohnde""
47	Archiv Deutsches Atomerbe
48	Infostelle Konrad
49	Ausstellung „Tatort Schacht KONRAD"
50	Ausstellungen „Letztes Jahr – Fotos von Mirka Pflüger" & „Tschüss AKW"
51	Informationszentrum Kraftwerke Lingen
52	Veranstaltung „Polizei und Anti-Atomkraftproteste in den 1970er und 1980er Jahren"
53	Brüter-Museum
54	Wanderausstellung „Das Atomzeitalter in Westfalen. Von der Zukunft zur Geschichte"
55	Wanderausstellung „Morsleben – Geschichte eines umstrittenen Atomprojekts"
56	Bergbau- und Sanierungslehrpfad
57	Bergbaumuseum Schloß Burgk Freital
58	Besucherbergwerk „Zinnkammern"
59	Besucherbergwerk „Markus Semmler"
60	Haldenlandschaft Aue-Bad Schlema
61	Ausstellung „Heil und Dunkel"
62	Infotafeln im ehemaligen Wismut Gewerbegebiet Coschütz/Gittersee
63	Lagerstättensammlung der Wismut GmbH
64	Lehrstollen am Silberbach
65	Wanderausstellung „Mythos Atom"
66	Museum Uranbergbau
67	Ausstellung „Die Bergbautechnik der Wismut"
68	Schacht 371
69	Schaubergwerk Frisch Glück „Glöckl"
70	Helmholtz-Zentrum Dresden-Rossendorf
71	Infostelle Morsleben
72	Wanderausstellung „Symbol Brokdorf – Die Geschichte eines Konflikts"
73	Bergbaumuseum und Schaubergwerk Ronneburg
74	BUGA-Park „Neue Landschaft Ronneburg"
75	Schmirchauer Höhe
76	Ausstellung „Was von der Wismut bleibt"
77	Wismut"Objekt9

Stand: 20.06.2024

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Auftraggeber: Bundesamt für die Sicherheit der nuklearen Entsorgung

Example I: „Atomic egg“ in Munich

Atomic egg at the Heinz Maier-Leibnitz Center	
federal state	Bavaria
type of place	Research
responsible institution	Technical University Munich
date	Since 1957
description	The Munich research reactor, also known as the ”atomic egg”, was the first nuclear facility in the Federal Republic of Germany and was commissioned in 1957. It was built as part of the “Atoms for Peace” program declared by US President Eisenhower and was used exclusively for research. Since 2013, the reactor has been part of the Heinz Maier-Leibnitz Center, the world’s leading center for neutron research in Germany.

Inbetriebnahme des „Atom-Ei“, Oktober 1957. © TUM. https://www.frm2.tum.de/frm2/ueber-uns/

Example II: putting nuclear cultural heritage into practice – Gorleben

Gorleben as a place of nuclear cultural heritage: different practices and places, e.g. memorials like the Beluga-Boat or the Gorleben Archive which preserves documents on direct-action interventions

GORLEBEN ARCHIV

Conclusions and outlook: relevance of nuclear cultural heritage

Nuclear cultural heritage as part of long-term governance

- Nuclear cultural heritage contributes to knowledge preservation
- Nuclear cultural heritage needs to be embedded within strategic development of decommissioning
- Nuclear cultural heritage is not made “about the community” but “with and by the community” (Rindzevičiūtė, 2022, 28)
- Should include methods of participatory governance (cf. Mbah 2022; Mbah/Kuppler 2024)

Next steps in the project:

- WP4: Detailed analysis of three case studies focusing on immaterial practices linked to material objects → **How can nuclear cultural heritage support a long-term waste governance?**

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Thank you for your attention!

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References

Beunen, R.; van Assche, K.; Gruezmacher, M. (2022): Evolutionary perspectives on environmental governance: Strategy and the co-construction of governance, community, and environment. In: *Sustainability* 14 (16), p. 9912. DOI: 10.3390/su14169912.

Brunnengräber, A. (2015): Ewigkeitslasten, Die "Endlagerung" radioaktiver Abfälle als soziales, politisches und wissenschaftliches Projekt - eine Einführung 1. Auflage. Baden-Baden: Nomos, Edition Sigma. Online available at https://ebookcentral.proquest.com/lib/kxp/detail.action?docID=4350203.

Chateau, Z.; Devine-Wright, P.; Wills, J. (2021): Integrating sociotechnical and spatial imaginaries in researching energy futures. In: *Energy Research & Social Science* 80, pp. 1–8. DOI: 10.1016/j.erss.2021.102207.

Davoudi, S.; Crawford, J.; Raynor, R.; Reid, B.; Sykes, O.; Shaw, D. (2018): Policy and Practice Spatial imaginaries: tyrannies or transformations? In: *Town Planning Review* 89 (2), pp. 97–124. DOI: 10.3828/tpr.2018.7.

François, E.; Schulze, H. (ed.) (2001): Deutsche Erinnerungsorte. 3 volumes (2). München: Beck.

Harrison, R. (2016): Archaeologies of emergent presents and futures. In: *Historical Archaeology* 50 (3), pp. 165–180. DOI: 10.1007/BF03377340.

Harrison, R. (2020): Heritage as future-making practices. In: Harrison, R.; DeSilvey, C.; Holtorf, C.; Macdonald, S.; Bartolini, N.; Breithoff, E. et al. (ed.): Heritage Futures. Comparative approaches to natural and cultural heritage practice. Unter Mitarbeit von Anders Högberg und Gustav Wollentz. London: UCL Press (Comparative Approaches to Natural and Cultural Heritage Practices), pp. 20–50.

Harrison, R.; DeSilvey, C.; Holtorf, C.; Macdonald, S.; Bartolini, N.; Breithoff, E. et al. (ed.) (2020): Heritage Futures, Comparative approaches to natural and cultural heritage practice. In collaboration with Högberg, A. and Wollentz, G. (Comparative Approaches to Natural and Cultural Heritage Practices). London: UCL Press. Online available at https://directory.doabooks.org/handle/20.500.12854/74734.

Hasse, R. and Krücken, G. (2009): Neo-institutionalistische Theorie. In: Kneer, G. and Schroer, M. (ed.): Handbuch soziologische Theorien. Wiesbaden: Springer VS (Handbuch), pp. 237–251.

Jasanoff, S. and Kim, S.-H. (2009): Containing the atom: Sociotechnical imaginaries and nuclear power in the United States and South Korea. In: *Minerva* 47 (2), pp. 119–146. DOI: 10.1007/s11024-009-9124-4.

Knaps, F.; Herrmann, S.; Mölders, T. (2022): Landscape identity: Approaches to its conceptualisation, capture and integration into place branding processes. In: Abassiharofteh, M.; Baier, J.; Göb, A.; Thimm, I.; Eberth, A.; Knaps, F. et al. (ed.): Spatial transformation. Processes, strategies, research design. Hanover: ARL - Academy for Territorial Development in the Leibniz Association (Forschungsberichte der ARL, 19), pp. 164–178.

References

Kroh, J. and Lang, A.-K. (2010): Erinnerungsorte. In: Gudehus, C.; Eichenberg, A. and Welzer, H. (ed.): Gedächtnis und Erinnerung. Ein interdisziplinäres Handbuch. Stuttgart, Weimar: Verlag J.B. Metzler (Springer eBook Collection), pp. 184–188.

Kuppler, S. and Hocke, P. (2019): The role of long-term planning in nuclear waste governance. In: *Journal of Risk Research* 22 (11), pp. 1343–1356. DOI: 10.1080/13669877.2018.1459791.

LaBelle, M. (2020): Energy cultures, Technology, justice, and geopolitics in Eastern Europe. Cheltenham, UK, Northampton, MA, USA: Edward Elgar Publishing.

Landström, C. and Kemp, S. (2020): The Power of Place, How Local Engagement with Geological Disposal of Radioactive Waste Re-situated Technoscience and Re-assembled the Public. In: *Science & Technology Studies* 33 (1), pp. 36–53, last accessed on 28 Mar 2023.

Levenda, A. M.; Richter, J.; Miller, T.; Fisher, E. (2019): Regional sociotechnical imaginaries and the governance of energy innovations. In: *Futures* 109, pp. 181–191. DOI: 10.1016/j.futures.2018.03.001.

May, S. and Holtorf, C. (2020): Uncertain futures. In: Harrison, R.; DeSilvey, C.; Holtorf, C.; Macdonald, S.; Bartolini, N.; Breithoff, E. et al. (ed.): Heritage Futures. Comparative approaches to natural and cultural heritage practice. Unter Mitarbeit von Anders Högberg und Gustav Wollentz. London: UCL Press (Comparative Approaches to Natural and Cultural Heritage Practices), pp. 263–275.

Mbah, Melanie. 2022. Participation in decision-making processes as a key to a successful long-term governance. In Technical Monitoring and Long-Term Governance of Nuclear Waste, ed. Peter Hocke , Sophie Kuppler, Ulrich Smeddinck and Thomas Hassel, 95-110. Baden-Baden: Nomos.

Mbah, M. and Kuppler, S. (2021): Raumsensible Long-term Governance zur Bewältigung komplexer Langzeitaufgaben. In: Brohmann, B.; Brunnengräber, A.; Hocke, P. and Isidoro Losada, A. M. (ed.): Robuste Langzeit-Governance bei der Endlagersuche. Soziotechnische Herausforderungen im Umgang mit hochradioaktiven Abfällen. Unter Mitarbeit von Bettina Brohmann, Achim Brunnengräber, Saleem Chaudry, Maria Rosaria Di Nucci, Rosaria Di Nucci, Stefanie Enderle et al. Bielefeld (Edition Politik), pp. 413–446.

NEA (2022): Stakeholder Confidence in Radioactive Waste Management: An Annotated Glossary of Key Terms – 2022 Update (Radioactive Waste Management, 2022). Online available at https://www.oecd-nea.org/upload/docs/application/pdf/2022-01/7606_fsc_annotated_glossary_2022_2022-01-20_08-49-30_223.pdf, last accessed on 31 May 2023.

Osborne, C.; Mayo, L.; Bussey, M. (2021): New frontiers in local government community engagement: Towards transformative place-based futures. In: *Futures* 131, p. 102768. DOI: 10.1016/j.futures.2021.102768.

References

Otto, A. and Leibenath, M. (2014): The interrelation between collective identities and place concepts in local wind energy conflicts. In: *The International Journal of Justice and Sustainability* 19 (6), pp. 660–676. DOI: 10.1080/13549839.2013.868871.

Penrose, S.; Harrison, R.; Holtorf, C.; May, S. (2020): The hundred-thousand-year question. In: Harrison, R.; DeSilvey, C.; Holtorf, C.; Macdonald, S.; Bartolini, N.; Breithoff, E. et al. (ed.): Heritage Futures. Comparative approaches to natural and cultural heritage practice. Unter Mitarbeit von Anders Högberg und Gustav Wollentz. London: UCL Press (Comparative Approaches to Natural and Cultural Heritage Practices), pp. 143–152.

Pescatore, C. and Palm, J. (2020): Preserving Memory and Information on Heritage and on reserving Memory and Information on Heritage and on Unwanted Legacies - New Tools for Identifying Sustainable Strategies to Prepare and Support Decision Making by Future Generations. In: SCEaR Newsletter 2020/1 (June) (UNESCO Memory of the World Programme), pp. 4–15. Online available at https://literaryarchives.files.wordpress.com/2020/07/scearnewsletter2020-1june30.pdf, last accessed on 31 May 2023.

Rindzevičiūtė, E. (2019): Nuclear cultural heritage: Position statement (AH/S001301/1). AHRC Research Networking Project. Kingston upon Thames. Online available at https://nuclearculturalheritage.files.wordpress.com/2019/11/2019-nuclear-cultural-heritage-position-statement.pdf, last accessed on 23 Nov 2022.

Rindzevičiūtė, E. (2022): Nuclear cultural heritage, From knowledge to practice. Kingston University London, UK. Kingston upon Thames. Online available at https://nuclearculturalheritage.files.wordpress.com/2022/10/2022-october-12-nuclear-heritage-final-report.pdf?force_download=true, last accessed on 20 Oct 2022.

Sadowski, J. and Bendor, R. (2019): Selling Smartness: Corporate Narratives and the Smart City as a Sociotechnical Imaginary. In: *Science, Technology, & Human Values* 44 (3), pp. 540–563. DOI: 10.1177/0162243918806061.

Schneiberg, M. and Soule, S. A. (2005): Institutionalization as a contested, multilevel process: The case of rate regulation in American fire insurance. In: McAdam, D.; Davis, G. F.; Zald, M. N. and Scott, W. R. (ed.): Social Movements and Organization Theory. Cambridge: Cambridge University Press (Cambridge Studies in Contentious Politics), pp. 122–160. Online available at https://www.cambridge.org/core/books/social-movements-and-organization-theory/institutionalization-as-a-contested-multilevel-process-the-case-of-rate-regulation-in-american-fire-insurance/1FB1041B7D0EE5DAAE179F4A0C26D540.

Suhari, M. (2022): Transdisziplinäre Zusammenarbeit. Kreatives Handeln und die Transformation von Energiekulturen, 2022. Online available at https://nbn-resolving.org/urn:nbn:de:bsz:1141-opus4-595.

Walker, G.; Cass, N.; Burningham, K.; Barnett, J. (2010): Renewable Energy and Sociotechnical Change: Imagined Subjectivities of ‘the Public’ and Their Implications. In: *Environ Plan A* 42 (4), pp. 931–947. DOI: 10.1068/a41400.

Back-up

Methodological approach: literature review

Identification of research clusters and associated keywords

Systematic search for relevant literature with search strings, i.e. “nuclear” & “heritage” combined with snowball search

Identification of ca. 350 publications of which about 200 were significant & scanned

Around 100 publications used for the literature review

Cluster	Keywords
cultural heritage	cultural heritage, cultural memories, heritage futures, (German) nuclear legacies
energy	(German) energy cultures
imaginaries	sociotechnical imaginaries (STI), spatial imaginaries
place	place attachment, place identitiy, identity politics, homeland/home
historical	places of remembrance, culture of remembrance, agency of objects
nuclearity	nuclearity, nuclear landscapes /spaces, nuclear identity
governance	long-term governance, reversibility

Literature review: Cultural Heritage

- Cultural heritages are a heterogenous **assemblage** of “objects, people, places, practices, pronouncements, bureaucratic apparatuses” that includes “various people, institutions, apparatuses (dispositifs) and the relations between them” (Harrison 2020, 37)
- Cultural heritage is not an ‘end-product’, but an on-going **practice**
  - Not just a technical and managerial practice, but also a cultural and political one
- Although heritage practices are concerned with the past, heritage work is just as much about conserving the past as it is about **making futures** (Penrose/Harrision 2020)
  - Preserving memory and information on “unwanted legacies” such as nuclear waste is crucial for preparing and supporting the decision making of future generations (Penrose/Harrision 2020; Pescatore/Palm 2020)
  - Waste has a certain “material and discursive legacy, the management of which is, like heritage, oriented towards the construction of particular kinds of actual and imagined futures” (Harrison 2020, 49; cf. Harrison 2016; May/Holtorf 2020)

Literature review: defining nuclear cultural heritage

“anything that has come into contact with nuclear science and technology”

and includes the “**collecting**, **storing**, **archiving**, **preserving** and **caring for** representative artefacts of nuclear material culture, mapping and safeguarding sites, preparing and selecting documentation, recording intangible practices, and establishing and keeping new archives” (Rindzevičiūtė 2019, 4)

Nuclear Cultural Heritage as…

- … a practice
- … meaning-making
- … future-orientated
- … spatialized and place-based

What does this mean for long-term nuclear waste governance?