



Geographies
of the
Anthropocene



IL Sileno
Edizioni

Climate change related urban transformation and the role of cultural heritage
Matthias Ripp & Christer Gustafsson (Eds.)

How does Cultural Heritage Foster Climate Action?
Examples of Histo-Culture-based Urban Resilience from Around the World

Marika Fior, Sapienza University of Rome, Italy (marika.fior@uniroma1.it)*

Rosa Romano, Sapienza University of Rome, Italy (rosa.romano@uniroma1.it)

Maria Paz Abad Gonzalez, Independent Architect, Rome, Italy (paz.abadg@gmail.com)^a

Jui Ambani, ICCROM – International centre for the study of preservation and restoration of cultural property, Rome, Italy (jui.ambani@iccrom.org)*^a

*Corresponding author

^a Case study contributors

Abstract

Climate variability and change have been ongoing. Urban areas with historical and cultural significance are vulnerable to the increasing effects of climate change, both physically (such as building materials durability) and socially (such as loss of inhabitants, internal displacement, tourism, and worsening economic conditions for disadvantaged populations). However, people and cities have proven to be resilient over time, even in the face of global challenges.

Combating climate change impacts on heritage and people requires consideration of social, cultural, environmental, and economic factors. This chapter focuses on the unique challenges posed by the presence of Cultural Heritage in an urban setting and explores design actions that balance preservation with innovation. By examining the physical and structural features of historical cities, their public spaces, and sociocultural connotations, the chapter aims to highlight how communities on the frontlines of the climate crisis use them as an expression of intrinsic resilience.

Through case studies from different climatic zones, the chapter explores the rediscovery and re-evaluation of ‘histo-cultural forms’ of climate change adaptation. It outlines techniques and solutions -from traditional and Indigenous knowledge to tangible structural features- that are being used to cope with heat islands, storms, floods, etc. and are congenial to heritage sites, in sustaining local culture and knowledge and know-how while demonstrating renewal and adaptability.

Keywords: climate-proof planning, adaptation, communities, historic-based solutions

Works cited

Achig, M.C., Zuñiga, M., Van Balen, K., Abad, L., 2013, “Sistema de registro de daños para determinar el estado constructivo en muros de adobe”, *MASKANA*, 4, 2, 71-84.

ASTM E2393/E2392M-10, 2016, *Standard guide for design of earthen wall building systems. Building Systems*, ASTM International, West Conshohocken, PA, UAS.

Bertuglia, C.S., Vaio, F., 2019, *Il fenomeno urbano e la complessità*, Bollati Boringhieri, Torino.

Binani, G.D., Rama Rao, T.V., 1954, *India at a Glance: A Comprehensive Reference Book on India*, Orient Longmans, India.



Climate change related urban transformation and the role of cultural heritage
Matthias Ripp & Christer Gustafsson (Eds.)

Blondet, M., Villa Garcia, G., Brzev, S., 2003, *Construcciones de adobe resistentes a los terremotos*, Earthquake Engineering Research Institute, California, USA.

Brewer, J., Riede, F., 2018, "Cultural heritage and climate adaptation: a cultural evolutionary perspective for the Anthropocene", *World Archaeology*, 50, 4, 554-569, <https://doi.org/10.1080/00438243.2018.1527246>.

Bonazza, A., De Nuntiis, P., Sardella, A., 2021, *Impatto dei cambiamenti climatici sui beni culturali e sul paesaggio. Affare assegnato n. 808 (impatto dei cambiamenti climatici sui beni culturali e sul paesaggio). Invio Contributo in risposta alla Nota Prot. n. 489/7a*, Istituto di Scienze dell'Atmosfera e del Clima, Consiglio Nazionale delle Ricerche, Bologna.

capaCITIES, year n.a., *Climate Resilient City Action Plan – Udaipur*, retrieved from: <https://www.capacitiesindia.org/about/> accessed on May 02 2023>.

Cassetti, R., 2005, *Roma e Lazio 1870-1945. La costruzione della capitale e della sua regione*, Gangemi Editore, Roma.

Carangui, S., 2010, *Estudio de los sistemas constructivos tradicionales en madera*, Facultad de Arquitectura, Universidad de Cuenca, Cuenca.

Chiri, G., Giovagnorio, I., 2015, "Gaetano Vinaccia's (1881–1971) Theoretical Work on the Relationship between Microclimate and Urban Design", *Sustainability*, 7, 4, 4448-4473, <https://doi.org/10.3390/su7044448>.

Choay, F., 1996, *La città. Utopie e realtà*, Einaudi, Torino.

Clayton, L.A., 1978, *Los astilleros de Guayaquil colonial* (Archivo Histórico de Guayas), 11, Ser. Col. Monográfica, Archivo Histórico del Guayas.

Corboz, A., 1983, "Il Territorio come palinsesto", *Casabella*, 516, 22-27.

Correia, M., Dipasquale, L., Mecca, S., 2014, *VERSUS: Heritage for tomorrow, vernacular knowledge for sustainable architecture*, Firenze University Press, Firenze.

CRATERre, 2012, *World heritage inventory of earthen architecture*, retrieved from: <http://unesdoc.unesco.org/images/0021/002170/217020e.pdf>.

De Cesaris, A., 2023, "Tehran: la storia urbana e le contraddizioni di una capitale", *Urbanistica* 167, Inu Edizioni, Roma, 48-59.

Della Torre, S., 2010, Preventiva, integrata, programmata: le logiche coevolutive della conservazione. In: Biscontin, G., Driussi, G. (Eds.), *Pensare la prevenzione. Manufatti, usi, ambienti: atti del XXVI convegno Scienza e Beni culturali*, Bressanone 13-16 luglio 2010, Venezia, Arcadia Ricerche, Venezia, 67-76.

Dipasquale, L., Mecca, I., 2016, "L'architettura vernacolare come modello codificato per il progetto contemporaneo sostenibile", *TECHNE*, 12, 190-198.

Eljuri, G., 2010, "Arquitectura tradicional en Azuay y Cañar. Técnicas, creencias, prácticas y saberes", *Serie Estudios Instituto Nacional de Patrimonio Cultural*, INPC, Ecuador.

Fabbricatti, K., Boissenin, L., Citoni, M., 2020, "Heritage Community Resilience: towards new approaches for urban resilience and sustainability", *City, Territory and Architecture. An interdisciplinary debate on project perspectives*, 7, 17, <https://doi.org/10.1186/s40410-020-00126-7>.

Fabbro, S., 2020, "Ecopolis: un approccio integrato alla resilienza dei sistemi territoriali non metropolitani", *Urbanistica Informazioni*, 289, Special Issue no. 15, 1-6.

Fratini, F., Pecchioni, E., Rovero, L., Tonietti, U., 2011, "The earth in the architecture of the historical centre of Lamezia Terme (Italy): Characterization for restoration", *Appl. Clay Sci.*, 53, 519-516.



Climate change related urban transformation and the role of cultural heritage
Matthias Ripp & Christer Gustafsson (Eds.)

Funiciello, R., Cologgi, P., 2008, I fattori di pericolosità e lo sviluppo urbano. In: Funiciello, R., Testa, O. (Eds.), *Periodici Tecnici – La Geologia di Roma – Dal centro storico alla periferia, Memorie descrittive della Carta Geologica d'Italia*, Ispra, Firenze, 80, 7-12.

Funiciello, R., Testa, O., 2008, Cambiamenti morfologici e sviluppo urbano nella città di Roma: il versante destro del Tevere. In: Funiciello, R., Testa, O. (Eds.), *Periodici Tecnici – La Geologia di Roma – Dal centro storico alla periferia, Memorie descrittive della Carta Geologica d'Italia*, Ispra, Firenze, 80, 261-274.

García Hermida, A., 2019, “New Vernacular Architecture. Acts of International seminar”, *New Vernacular Architecture*, Escuela Técnica Superior de Arquitectura de Madrid (ETSAM), 17-18 October 2019, 55-64.

García, G., Tamayo, J., Malo, G., 2017, “Seminario iberoamericano de arquitectura y construcción con tierra”, *Valoración de la arquitectura vernácula de Azuay y Cañar, Ecuador* (17th ed., ser. siacot), PROTERRA, La Paz.

Gerrard, C., Gutiérrez, A., 2018, “The Qanat in Spain: Archaeology and Environment”, retrieved from: <edition-topoi.org/articles/details/1435>.

Gerundo, C., 2016, *Città e clima: forma urbana e adattamento ai cambiamenti climatici*, Tesi di Dottorato in Ingegneria dei Sistemi Idraulici, di Trasporto e Territoriali (XXVIII Ciclo), Università Federico II di Napoli, Supervisor Prof. Marialuce Stanganelli.

González Suárez, F., 2017, *Historia General de la República del Ecuador*, Biblioteca Cervantes Virtual.

Godwin, P. J., 2011, “Building conservation and sustainability in the United Kingdom”, *Procedia Engineering*, 20, 12-21, doi: <http://doi.org/10.1016/j.proeng.2011.11.135>.

Greenhalgh, T., 1997, “How to read a paper: Papers that go beyond numbers (qualitative research)”, *BMJ*, 315, 740, doi: <https://doi.org/10.1136/bmj.315.7110.740>.

Greenhalgh, T., Thorne, S., Malterud, K., 2018, “Time to challenge the spurious hierarchy of systematic over narrative reviews?”, *Eur J Clin Invest.* 2018 June 48, 6, e12931, doi: 10.1111/eci.12931.

Guerrero, B., 2016, January 8, “Arquitectura vernácula Paja Toquilla y otros materiales de la selva”, *Clave!*, retrieved from: <<https://www.clave.com.ec/arquitectura-vernacula-paja-toquilla-y-otros-materiales-de-la-selva/>>.

Hess, J.J., Lm, S., Knowlton, K., Saha, S., Dutta, P., Ganguly, P., Mavalankar, D., 2018, “Building Resilience to Climate Change: Pilot evaluation of the impact of India’s first heat action plan on all-cause mortality”, *Journal of Environmental Public Health*, 7973519, doi: 10.1155/2018/7973519.

Hoegh-Guldberg, O., Jacob, D., Taylor, M., Bindi, M., Brown, S., Camilloni, I., Diedhiou, A., Djalante, R., Ebi, K.L., Engelbrecht, F., Guiot, J., Hijioka, Y., Mehrotra, S., Payne, A., Seneviratne, S.I., Thomas, A., Warren, R., Zhou, G., 2018, Impacts of 1.5°C Global Warming on Natural and Human Systems. In: Masson-Delmotte, V., et al. (Eds.), *Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty*, Cambridge University Press, Cambridge, NY, USA, 175-312, <https://doi.org/10.1017/9781009157940.005>.

Holtorf, C., 2018, “Embracing change: how cultural resilience is increased through cultural heritage”, *World Archaeology*, 50, 4, 639-650, doi: 10.1080/00438243.2018.1510340.

Houben, H., Guillaud H., 1994, “Earth construction: A comprehensive guide”, *CRATerre-EAG*, Intermediate Technology Publications, Marseille.



Climate change related urban transformation and the role of cultural heritage
Matthias Ripp & Christer Gustafsson (Eds.)

ICCROM-FAR, 2022, First Aid and Resilience for Cultural Heritage in Times of Crisis Programme. In: Tandon, A. (Ed.), *Net Zero: Heritage for Climate Action*, retrieved from: <<https://www.iccrom.org/projects/net-zero-heritage-climate-action>>.

ICOMOS, 1999, ICOMOS. CIAV. *International Comitee of Vernacular Architecture*, retrieved from: <http://www.international.icomos.org/charters/vernacular_sp.pdf>.

Insolera, I., 2011, *Roma moderna. Da Napoleone I al XXI secolo*, Einaudi, Torino.

IPCC, 2022, *Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* [H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Lössche, V. Möller, A. Okem, B. Rama (Eds.)], Cambridge University Press, Cambridge, NY, USA, doi:10.1017/9781009325844.

Lanzini, M., Mazza, R., Capelli, G., 2008, Le antiche alluvioni del Tevere ed i dissesti storici (Prati-Balduina XVII Municipio). In: Funicello, R., Testa, O. (Eds.), *Periodici Tecnici – La Geologia di Roma – Dal centro storico alla periferia, Memorie descrittive della Carta Geologica d'Italia*, Ispra, Firenze, 80, 185-194.

Madrid, 2009, Ciudadanía y Patrimonio, *madridciudadaniaypatrimonio*, retrieved from: <<https://madridciudadaniaypatrimonio.org/contenido/coordinadora-salvemos-la-dehesa-de-la-villa>>.

Magnaghi, A., 2000, *Il progetto locale*, Bollati Boringhieri, Torino.

Magrinyá, F., Marzá, F., 2009, *Cerdà, 150 años de modernidad*, ACTAR Publishers, New York.

MMHPTN - Maharana Mewar Historical Publication Trust & Nayyar, 2020, *About LAKES of Udaipur, Water Conservation ahead of its time*, *Esamskriti.com*, retrieved from: <<https://www.esamskriti.com/e/Culture/Indian-Culture/About-LAKES-of-Udaipur,-Water-Conservation-ahead-of-its-time-1.aspx>>.

Manca, A.R., Benczur, P., Giovannini, E., 2017, *Building a Scientific Narrative Towards a More Resilient EU Society*, JRC, Publications Office of the European Union, Luxembourg.

Martinez-Santos, P., Martinez-Alfaro, P., 2012, “A Brief Historical Account of Madrid’s Qanats”, *GROUND WATER*, 50, 645-653.

Minke, G., 1994, *Manual de construcción en tierra*, Kassel, Editorial Nordan Comunidad, Alemania.

Moholy-Nagy, S., 1976, *Native genius in anonymous architecture*, Schocken Books.

Musco, F., Magni, F., 2014, Mitigazione e adattamento: le sfide poste alla pianificazione del territorio. In: Musco, F., Fregolent, L. (Eds.), *Pianificazione urbanistica e clima urbano. Manuale per la riduzione dei fenomeni di isola di calore urbano*, Il Poligrafo, Padova, 17-28.

CSE - Centre for Science and Environment, 2020, *Traditional water harvesting systems*, retrieved from: <<https://www.cseindia.org/traditional-water-harvesting-systems-683>>.

Nelson, M.K., Shilling, D. (Eds.), 2018, *Traditional Ecological Knowledge: Learning from Indigenous Practices for Environmental Sustainability (New Directions in Sustainability and Society)*, Cambridge University Press, <https://doi.org/10.1017/9781108552998>.

Oliver, P., 2006, *Built to meet needs: cultural issues in vernacular architecture*, Elsevier, Oxford.

OMCG - Open Method of Coordination Group, 2022, *Rafforzare la resilienza del patrimonio culturale ai cambiamenti climatici Dove il Green Deal europeo incontra il patrimonio culturale*, Publications Office of the European Union, Luxembourg.

Pacheco-Torgal, F., Jalali, S., 2012, “Earth construction: Lessons from the past for future eco-efficient construction”, *Construction and Building Materials*, 29, 512-519.



Climate change related urban transformation and the role of cultural heritage
Matthias Ripp & Christer Gustafsson (Eds.)

Peralta González, C., 2017, *La arquitectura tradicional en madera en las viviendas de la Cuenca del Río Guayas durante el segundo auge cacaotero (1880 – 1920) (thesis)*, Secretaría de Ciencia y Tecnología, FAPyD-UNR, Guayaquil.

Pérez Gálvez, F., Rubio de Hita, P., Ordóñez, M., Morales, C., Rodríguez, L., 2012, “Sustainable restoration of traditional building systems in the historical centre of Sevilla (Spain)”, *Energy and Buildings*, 62, 648-659, <http://doi.org/10.1016/j.enbuild.2012.05.009>.

Pesantes, M., 2011, “La arquitectura popular y vernácula en las provincias de Azuay y Cañar”, *Arquitectura tradicional en Azuay y Cañar. Técnicas, creencias, prácticas y saberes. Serie estudios*, Instituto Nacional de Patrimonio Cultural, Cuenca.

Pica, A., Del Monte, M., 2021, “La Geomorfología di Roma: il contributo delle carte storiche”, *Memorie descrittive della Carta Geologica d'Italia*, 108, 143-154.

Redaelli, G., 2019, “PAX-Patios de la Axerquía Urban Regeneration and Social Innovation in a Heritage Context”, *Built Heritage*, 1, 91-104.

Rudofsky, B., 1970, *Architecture without Architects: A Short Introduction to Non-Pedigreed Architecture*, *Art Education*, 23, 71, doi: 10.2307/3191516.

Secchi, B., 2005, *La città del ventesimo secolo*, Laterza, Bari.

Shirvani Dastgerdi, A., Sargolini, M., Broussard Allred, S., Chatrchyan, A., De Luca, G., 2020, “Climate Change and Sustaining Heritage Resources: A Framework for Boosting Cultural and Natural Heritage Conservation in Central Italy”, *Climate*, 8, 26, doi:10.3390/cli8020026.

Todaro, P., 2007, “Lotta alla desertificazione - il progetto foggaras per il recupero dei sistemi idrici tradizionali nel Sahara algerino, wilaya d'Adrar”, *Proceeding. XIII Congresso Consiglio Nazionale dei geologi d'Italia*, Matera 10-11-12 Maggio 2007, Matera.

Udaipur Urja, 2022, July 4, *Scorching Heat & Dry Wells. The Adverse Impact of Climate Change on Farming Households*, retrieved from: <<https://www.udaipururja.in/helping-hands/scorching-heat-dry-wells-the-adverse-impact-of-climate-change-on-farming-households/>>.

UNDRR – United Nations Disaster Risk Reduction, 2015, *Sendai Framework for Disaster Risk Reduction. 2015-2030*, United Nations, Geneva.

UNESCO, 2013, *The Hangzhou Declaration: Placing Culture at the Heart of Sustainable Development Policies*, retrieved from: <<https://unesdoc.unesco.org/ark:/48223/pf0000221238>>.

UNESCO, 2016, *UNESCO. World Heritage Convention*, retrieved from: <<https://whc.unesco.org/en/list/1506/>>.

UN - United Nations, 2019, *World Urbanization Prospects. The 2018 Revision (ST/ESA/SER.A/420)*, New York, United Nations, retrieved from: <<https://population.un.org/wup/Publications/>>.

Vázquez, L., Achig-Balarezo, M.C., Cardoso, F., 2018, “Minga: el patrimonio intangible en la campaña de mantenimiento de San Roque, Cuenca – Ecuador”, *Arte y Sociedad. Revista de Investigación*, retrieved from: <<http://asri.eumed.net/14/minga-ecuador.html>>.

Vázquez, L., Cardoso, F., Pogo, M., Tenén, T., Barsallo, G., Achig-Balarezo, C., 2018, “La minga: modelo participativo ancestral aplicado en las edificaciones de tierra del sur del Ecuador”, *Siacot 2018 Tierra, Cultura, Hábitat Resiliente y Desarrollo Sostenible*, 18, retrieved from: <<http://dspace.ucuenca.edu.ec/bitstream/123456789/38475/1/documento.pdf>>.

Vinaccia, G., 1952, *Per la città di domani*, vol. 1, Fratelli Palombi Editore, Roma.

Wolfram, M., 2016, “Conceptualizing Urban Transformative Capacity: A Framework for Research and Policy”, *Cities*, 51, 121-130.

Wright, D., 1981, *Arquitecturas de adobe*, Editorial Gustavo Gili, Barcelona.