

How climate change affects Intangible Heritage: The case of Catalan human towers

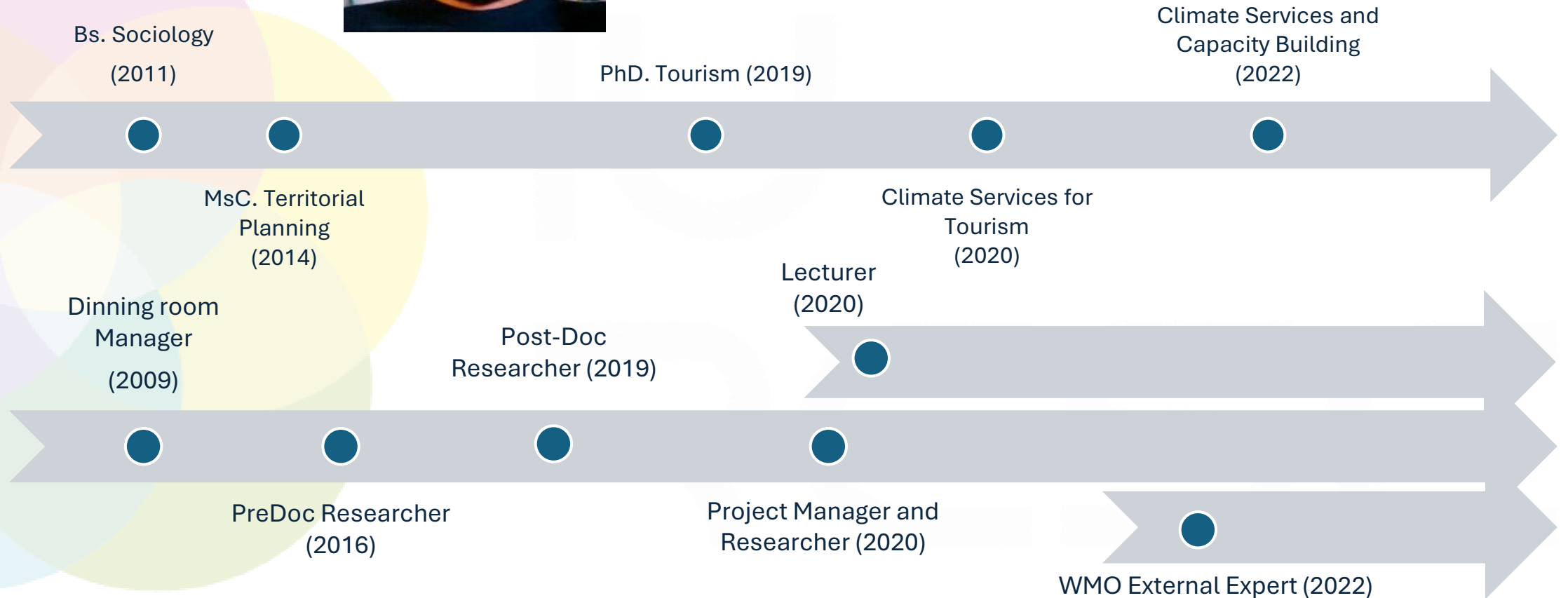
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Myself



URV – IURESCAT – C3



Basic Climate Change Science



Climate Economics and Territorial Analysis



Climate Justice and Governance, Environmental law



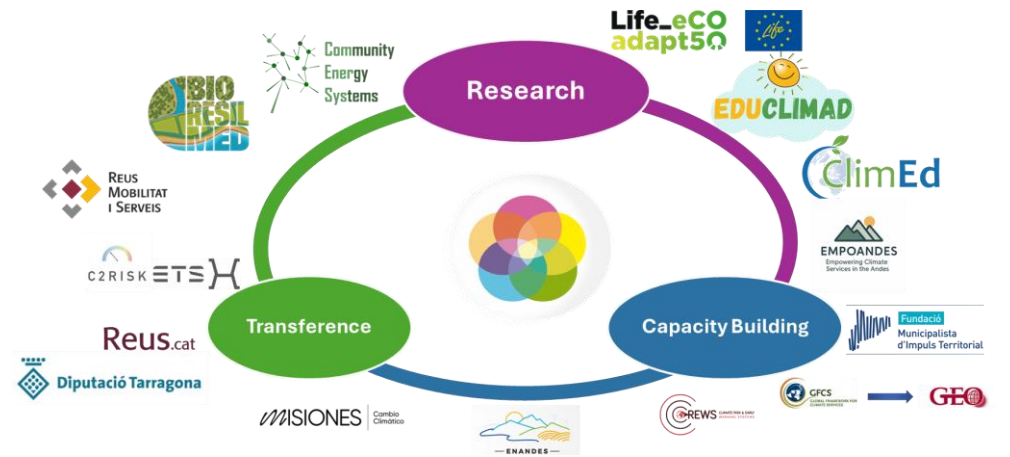
Climate and contamination impacts on human (health and behaviour) and ecosystems



Technological solutions



Climate and Environmental education



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Objetivos

Paquetes de Trabajo

Resulta

UNderstanding CLimate Dynamics in Western AFRica using a new Observational Data Set

Mejoramos la resiliencia climática en África Occidental (Benín, Níger y Togo) mediante el rescate de datos, control de calidad, homogeneización y generación de nuevos productos y servicios climáticos orientados al usuario.

Conoce los Objetivos

Contáctanos

Contents



Human Towers as protected ICH

Overview from reanalysis

In situ measurements

Co-creation process for adaptation

Exploring impacts on other ICH expressions

Take home messages

Human Towers as protected ICH

- **Unesco's Intangible Cultural Heritage (Nov 2010)**
 - Castells are traditional human towers built in Catalonia, especially during local festivals
 - They represent teamwork, trust, balance, and community strength
 - Each tower is formed by people standing on each other's shoulders in structured levels
 - The base (pinya) provides stability, while lighter members climb to the top
 - The tower is completed when a child (enxaneta) reaches the top and raises their hand



More info



Overview from reanalysis

Olano Pozo et al. 2024



Study target

June 24th: Valls
 August 15th: La Bisbal del Penedès
 August 19th: Tarragona
 August 30th: Vilafranca del Penedès



Data acquisition
 (1951-2023)

Hourly (from 12h to 15h) temperature at single level and humidity at pressure level (ERA5 land Reanalysis)



Data computation

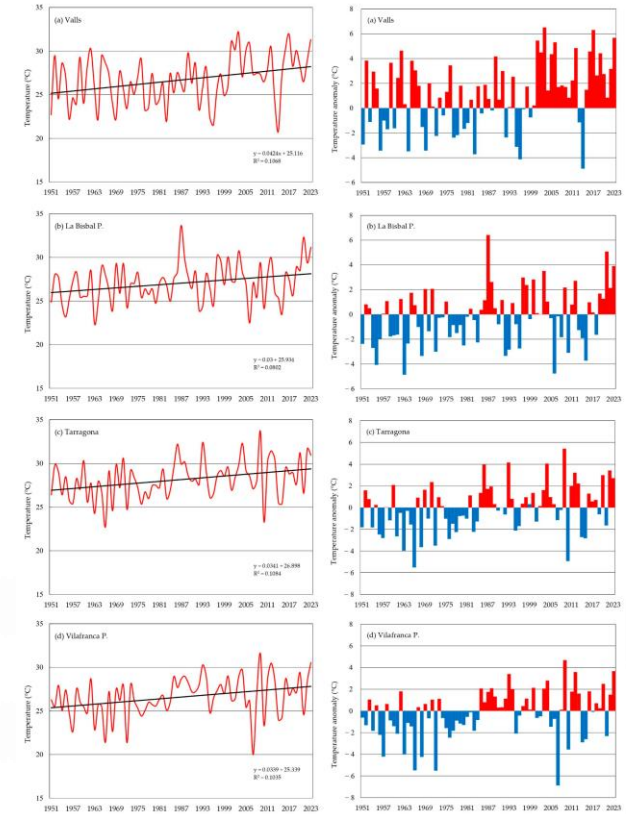
Temperature trends and variations
 Temperature anomalies (reference period 1971-2000)
 Heat index variations by threshold

Valls (24 June; 12-15h)						Tarragona (19 August; 12-15h)							
1951	1952	1953	1954	1955	1956	1957	1951	1952	1953	1954	1955	1956	1957
1958	1959	1960	1961	1962	1963	1964	1958	1959	1960	1961	1962	1963	1964
1965	1966	1967	1968	1969	1970	1971	1965	1966	1967	1968	1969	1970	1971
1972	1973	1974	1975	1976	1977	1978	1972	1973	1974	1975	1976	1977	1978
1979	1980	1981	1982	1983	1984	1985	1979	1980	1981	1982	1983	1984	1985
1986	1987	1988	1989	1990	1991	1992	1986	1987	1988	1989	1990	1991	1992
1993	1994	1995	1996	1997	1998	1999	1993	1994	1995	1996	1997	1998	1999
2000	2001	2002	2003	2004	2005	2006	2000	2001	2002	2003	2004	2005	2006
2007	2008	2009	2010	2011	2012	2013	2007	2008	2009	2010	2011	2012	2013
2014	2015	2016	2017	2018	2019	2020	2014	2015	2016	2017	2018	2019	2020
2021	2022	2023					2021	2022	2023				

La Bisbal del Penedès (15 August; 12-15h)						Vilafranca del Penedès (30 August; 12-15h)							
1951	1952	1953	1954	1955	1956	1957	1951	1952	1953	1954	1955	1956	1957
1958	1959	1960	1961	1962	1963	1964	1958	1959	1960	1961	1962	1963	1964
1965	1966	1967	1968	1969	1970	1971	1965	1966	1967	1968	1969	1970	1971
1972	1973	1974	1975	1976	1977	1978	1972	1973	1974	1975	1976	1977	1978
1979	1980	1981	1982	1983	1984	1985	1979	1980	1981	1982	1983	1984	1985
1986	1987	1988	1989	1990	1991	1992	1986	1987	1988	1989	1990	1991	1992
1993	1994	1995	1996	1997	1998	1999	1993	1994	1995	1996	1997	1998	1999
2000	2001	2002	2003	2004	2005	2006	2000	2001	2002	2003	2004	2005	2006
2007	2008	2009	2010	2011	2012	2013	2007	2008	2009	2010	2011	2012	2013
2014	2015	2016	2017	2018	2019	2020	2014	2015	2016	2017	2018	2019	2020
2021	2022	2023					2021	2022	2023				

no discomfort caution extreme caution

Source: Olano et al. 2024



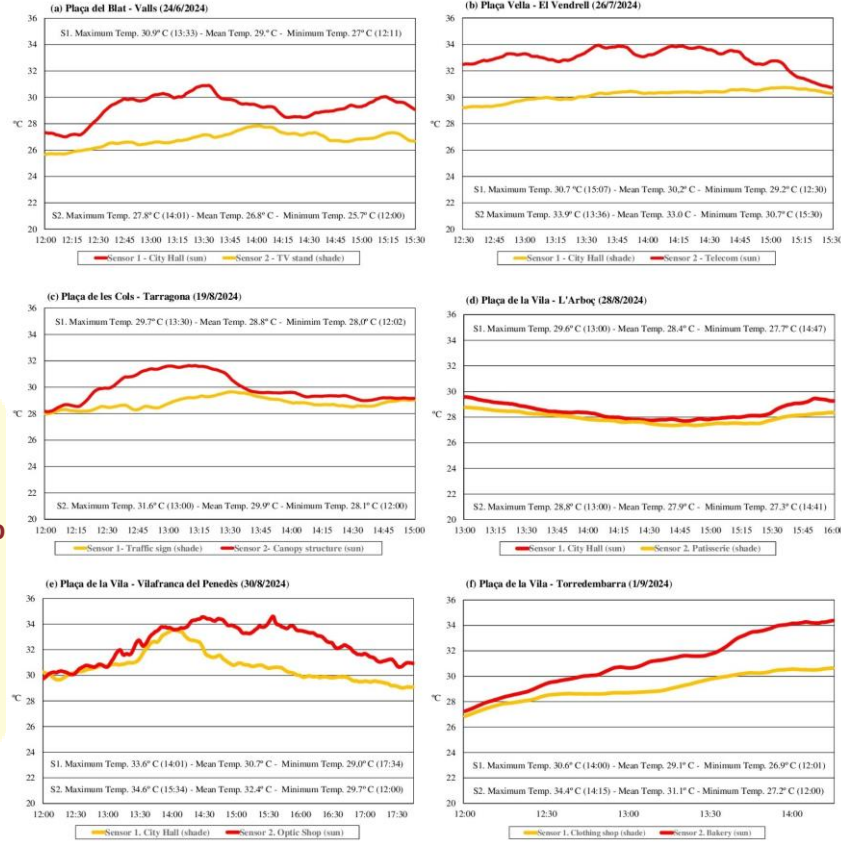
Source: Olano et al. 2024

In situ measurements. Noon

Saladié et al. 2025



Sensors in el Vendrell, July 26. Photo by Jon Xavier Olano



Source: Saladié et al. 2025

Evolution of Heat Index (Values en °C) - El Vendrell 26/07/2024 (Diada de Santa Anna)
 Plaça Vella : Sensor 1 - Façana Església - Ajuntament

12:30-12:45	12:45-13	13-13:15	13:15-13:30	13:30-13:45	13:45-14	14-14:15	14:15-14:30	14:30-14:45	14:45-15	15-15:15	15:15-15:30
31,70	31,75	32,28	32,54	32,78	33,10	33,07	33,26	33,33	33,70	33,46	33,38
31,60	31,83	32,28	32,41	32,82	33,25	32,97	33,30	33,46	33,87	33,07	33,38
31,60	31,86	32,29	32,47	33,06	33,37	33,04	33,36	33,53	33,61	33,05	33,38
31,63	32,00	32,41	32,47	33,07	33,48	33,22	33,00	33,49	33,56	33,32	33,50
31,76	32,00	32,41	32,36	33,36	33,40	33,02	32,87	33,30	33,43	33,51	33,33
31,95	32,05	32,55	32,27	33,17	33,51	33,11	33,02	33,04	33,17	33,50	33,43
31,88	32,03	32,53	32,28	33,12	33,35	33,09	33,03	33,18	33,05	33,68	33,49
31,76	32,05	32,63	32,49	33,21	33,19	33,10	33,06	33,17	33,26	33,87	33,47
31,78	32,16	32,73	32,57	32,94	33,32	33,28	33,16	33,55	33,31	33,94	33,55
31,71	32,22	32,74	32,74	32,82	33,25	33,11	33,35	33,68	33,37	34,04	32,83
31,76	32,04	32,75	32,97	33,15	33,09	33,13	33,31	33,53	33,45	33,62	33,26
31,82	32,19	32,71	32,82	33,18	33,17	33,31	33,37	33,47	33,77	33,31	32,93
31,74	32,28	32,77	32,62	33,47	33,09	33,07	33,31	33,36	33,55	33,52	32,92
31,70	32,33	32,60	32,80	33,03	33,35	33,03	33,32	33,12	33,60	33,66	32,80
31,77	32,38	32,55	32,75	33,20	33,07	33,24	33,40	33,50	33,25	32,87	
Neutral S26° C (0%of time)			Caution 26,1-32° C (10%of time)			Utmost caution 32,1-40° C (90%of time)					

Evolution of Heat Index (Values en °C) - Valls 24/06/2024 (Diada de Sant Joan)
 Plaça Vella : Sensor 2 - Movistar

12:30-12:45	12:45-13	13-13:15	13:15-13:30	13:30-13:45	13:45-14	14-14:15	14:15-14:30	14:30-14:45	14:45-15	15-15:15	15:15-15:30
35,65	36,24	36,47	35,87	36,77	37,84	36,57	37,66	37,94	37,01	35,74	34,19
35,48	36,18	36,31	36,02	36,95	37,59	36,52	37,77	36,80	36,65	35,17	34,25
35,59	36,25	36,29	35,87	37,52	37,60	36,94	37,19	37,12	36,38	35,66	34,00
35,63	36,39	36,29	36,05	37,79	37,50	36,80	37,04	36,99	36,17	36,05	34,08
35,85	36,50	36,41	35,88	37,97	37,48	36,70	37,20	36,63	35,64	35,76	34,03
35,97	36,80	36,42	35,93	37,60	37,35	36,83	37,21	36,67	35,55	35,90	33,82
35,93	36,71	36,36	36,03	37,60	36,92	37,24	37,56	36,55	35,43	35,48	33,94
36,07	36,71	36,53	36,27	37,20	36,81	37,53	37,61	36,77	35,38	35,51	34,00
35,85	36,63	36,36	36,05	37,20	36,71	37,43	37,92	37,09	35,70	35,49	33,65
36,03	36,49	36,30	36,25	37,09	36,57	37,78	37,76	36,94	35,61	35,28	33,38
36,01	36,46	36,25	36,54	37,62	36,35	37,43	37,57	37,17	35,63	34,60	33,66
36,05	36,42	36,25	36,49	37,47	36,29	37,49	37,83	36,95	35,77	34,33	33,34
36,02	36,52	36,10	36,93	37,50	36,45	37,54	37,50	36,63	35,53	34,52	33,28
36,02	36,64	36,16	36,55	37,23	36,57	37,32	37,48	37,11	35,93	34,65	33,31
36,08	36,48	36,00	36,95	37,39	36,41	38,09	37,11	37,10	35,88	34,10	33,26
Neutral S26° C (0%of time)			Caution 26,1-32° C (00%of time)			Utmost caution 32,1-40° C (100%of time)					

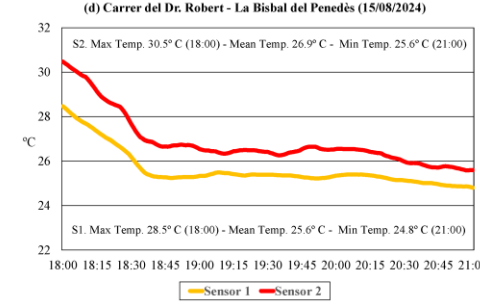
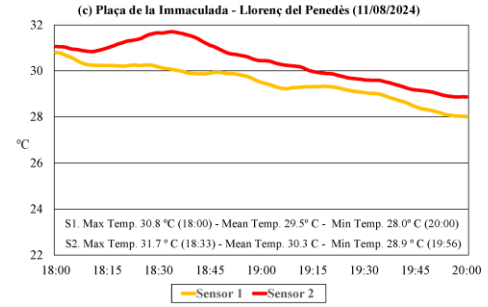
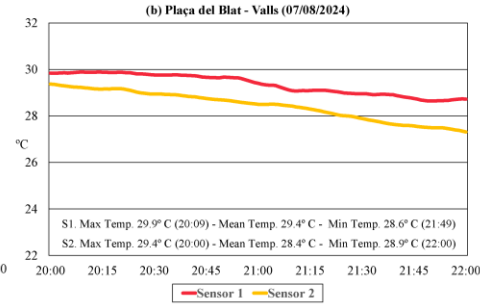
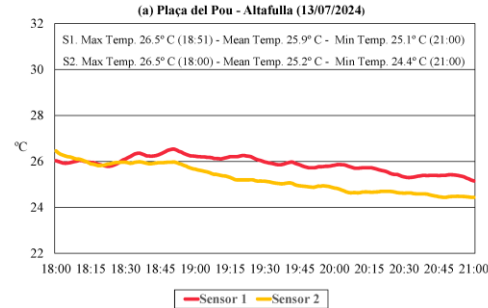
In situ measurements. Afternoon

Source: Boqué-Ciurana et al. 2025

Boqué-Ciurana et al. 2025



Exhibitions in Valls, Firagost (8 August 2024). Photo by Òscar Sala dié



Evolution of Heat Index (values in °C) - Valls 7/08/2024

Sensor 1 - Façana Ajuntament

20:00-20:15	20:15 - 20:30	20:30 - 20:45	20:45 - 21:00	21:00 - 21:15	21:15-19:30	21:30-21:45	21:45-22:00
31,38	31,31	31,24	31,56	30,95	31,03	31,45	30,94
31,36	31,50	31,08	31,54	31,03	31,49	31,11	30,75
31,17	31,48	31,74	31,81	31,02	31,01	31,15	30,84
31,44	31,31	31,25	31,79	31,48	31,09	31,27	30,87
31,28	31,94	31,96	32,34	30,90	31,34	31,11	31,34
31,17	31,21	31,37	31,74	30,82	31,01	31,41	31,34
31,89	31,37	31,93	31,37	30,77	31,21	30,88	31,43
31,49	31,60	31,40	31,48	30,73	31,07	31,79	31,86
31,40	31,51	31,80	32,25	30,66	31,64	31,44	31,75
31,36	31,98	31,89	31,33	30,65	31,29	31,07	31,63
31,37	31,11	31,84	31,19	31,20	31,32	30,83	31,61
31,56	31,35	31,70	31,46	31,34	31,20	31,04	31,61
31,19	31,65	31,84	31,33	31,21	31,43	30,97	31,80
32,05	31,29	31,35	30,96	31,22	31,25	31,29	31,35
31,41	31,32	31,89	31,02	31,15	31,82	30,78	31,27
Neutral ≤26°C (0% of time)		Caution 26,1-32°C (99% of time)			Utmost caution 32,1-40°C (1% of time)		

Evolution of Heat Index (values in °C) - Valls 7/08/2024

Sensor 2 - TV

20:00-20:15	20:15 - 20:30	20:30 - 20:45	20:45 - 21:00	21:00 - 21:15	21:15-19:30	21:30-21:45	21:45-22:00
30,35	30,42	30,05	29,98	29,65	29,55	29,36	29,03
30,27	30,36	29,86	29,94	29,75	29,55	29,29	29,00
30,27	30,30	29,91	29,92	30,04	29,57	29,25	28,99
30,34	30,39	29,97	29,90	29,61	29,52	29,23	28,97
30,26	30,38	29,92	30,16	29,75	29,54	29,18	29,09
30,20	30,24	29,94	29,99	29,76	29,59	29,15	29,04
30,14	30,24	30,05	29,88	29,71	29,52	29,13	29,01
30,31	30,13	30,30	29,77	29,75	29,48	29,10	28,97
30,19	30,10	30,16	29,92	29,64	29,47	29,09	28,98
30,15	30,04	30,17	29,69	29,73	29,64	29,12	28,95
30,14	30,04	30,03	29,66	29,65	29,43	29,08	28,94
30,08	30,04	30,37	29,69	29,62	29,44	29,10	28,90
30,04	30,07	30,05	29,69	29,59	29,38	29,07	28,86
30,18	29,99	30,09	29,64	29,72	29,36	29,07	28,85
30,12	30,12	30,07	29,64	29,57	29,35	29,06	28,81
Neutral ≤26°C (0% of time)		Caution 26,1-32°C (100% of time)			Utmost Caution 32,1-40°C (0% of time)		

Co-creation Process for adaptation measures

Saladié et al. 2026

- Participatory workshops with casteller teams
- 10 teams, 109 participants, 13 groups
- Participant profile: sex, age, position, experience
- Brainstorming on climate change adaptation measures
- Focus on summer heat, humidity and sunlight
- Priority–feasibility assessment with 5-point Likert scale
- Content analysis of stickers, matrix positions and field notes

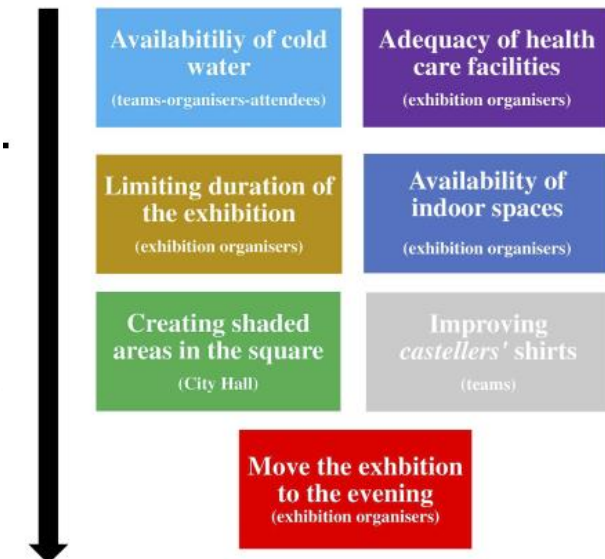


Figure 6. Proposal for prioritising climate change adaptation measures based on their feasibility. Authors' own work

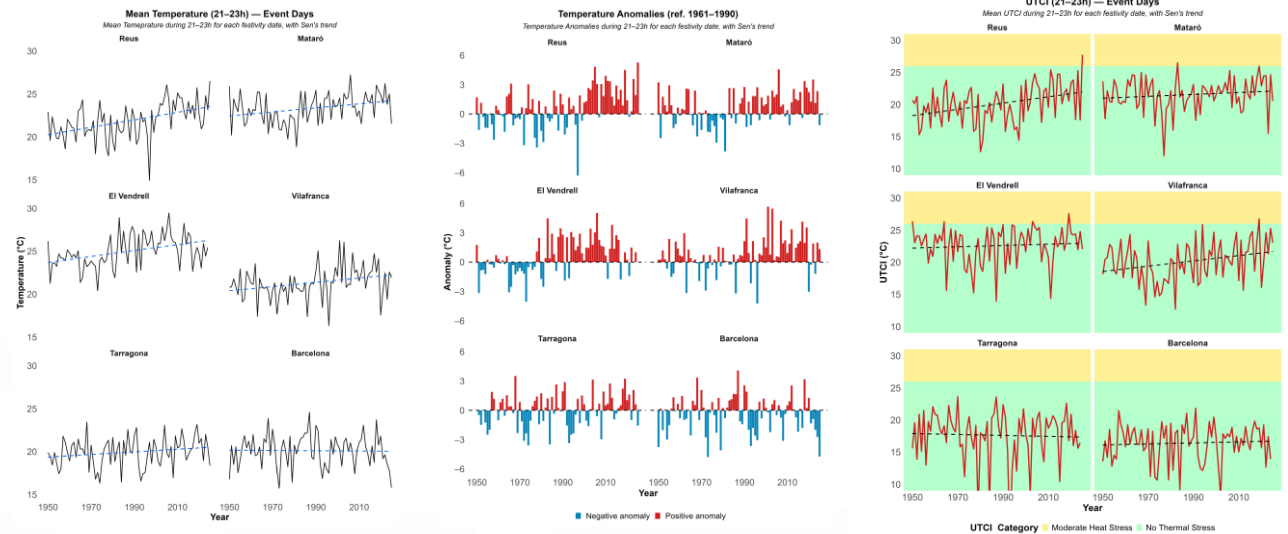
Source: Saladié et al. 2026

Exploring impacts on other ICH expressions

Olano Pozo et al. 2026



Fire runs in el Vendrell, July 26. Photo by Jon Xavier Olano



Missatges clau

El canvi climàtic no és només un augment de la temperatura, és a més, un canvi en la freqüència, la intensitat i la durada dels extrems

Els indicadors climàtics ens ajuden a detectar aquests canvis i a entendre millor què està passant al territori

Biologia, Geografia i Geologia ofereixen mirades complementàries per interpretar els impactes del canvi climàtic

El Vendrell és un bon exemple local de com un fenomen global es manifesta en la vida quotidiana, el paisatge i les activitats humanes

Els projectes aplicats permeten transformar dades climàtiques en eines útils per adaptar-nos millor al futur