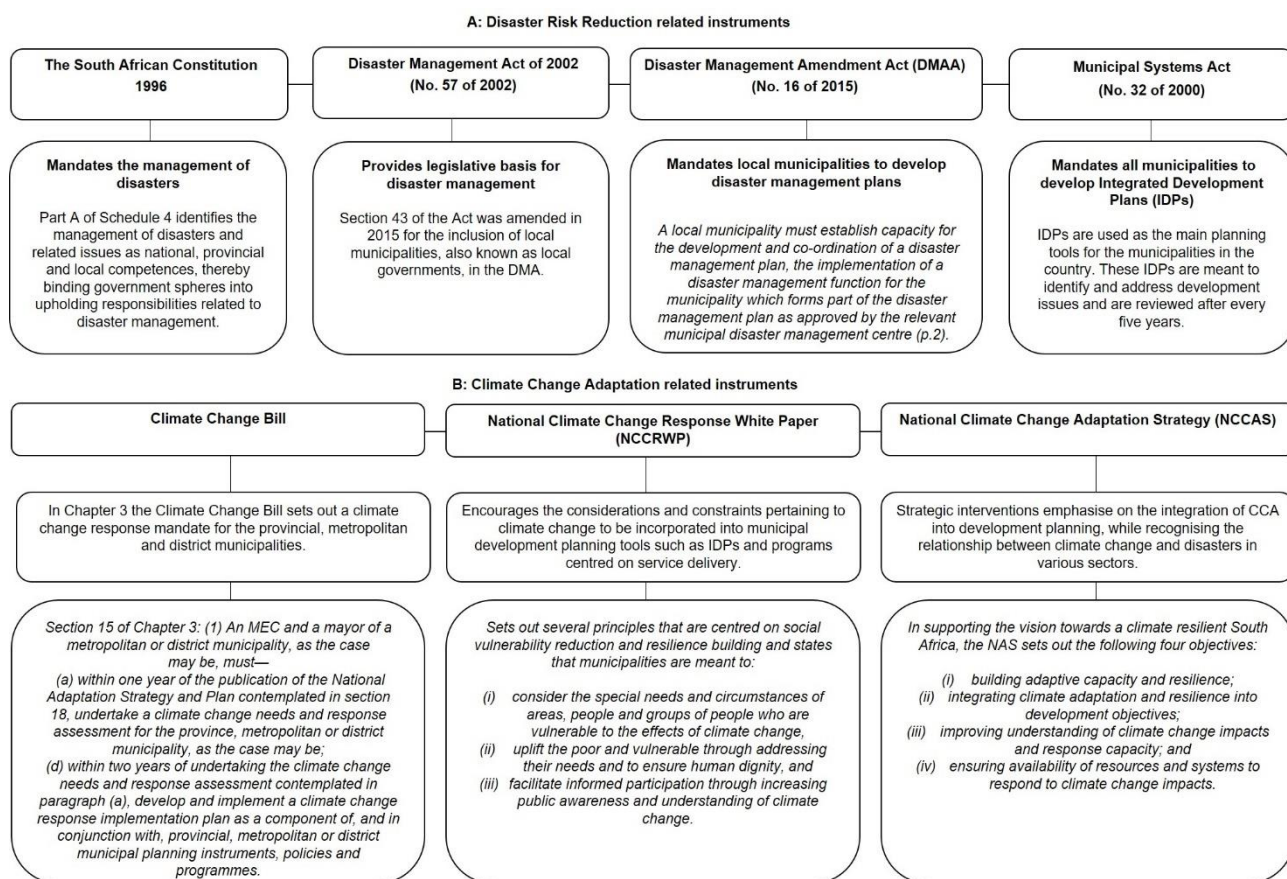


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Supplementary figure 1: South Africa’s instruments related to (A) disaster risk reduction and (B) climate change adaptation for addressing climate change and extreme events.

Supplementary table 1: Resilience-building and social vulnerability reduction themes used to analyse municipal actions. Note that this is a non-exhaustive list of themes.

Themes	Codes	Justification
Communication and information ¹⁻⁶	<ul style="list-style-type: none"> Information/ knowledge sharing Early warning systems Meetings 	Enable better identification, preparation, and implementation of safety measures. This reduces the level of vulnerability through reducing the level of exposure and, hence, helps in the building of resilient communities when there is adequate and transparent dissemination of information.
Awareness ^{3,7,8}	<ul style="list-style-type: none"> Awareness raising campaigns Adaptive capacity 	Enable people to be familiar with the different disasters and extreme events they are likely to face. People may be better positioned to proactively adopt protective measures and ways to mitigate and adapt to extreme events, thereby increasing resilience and reducing vulnerability.
Community organisation ^{1-3,8-10}	<ul style="list-style-type: none"> Collaboration and participation Multi-stakeholder participation Community development Capacity building 	Encourage self-efficiency and equip people for the future use of local ecological knowledge and thus, builds resilience and reduce social vulnerability. People are presented with an opportunity to learn from others, share experiences and collaborate in finding ways to mitigate and adapt to climate change extreme events.
Education ^{1,3,7,8,11,12}	<ul style="list-style-type: none"> Training campaigns Posters Education 	Enables people to be self-reliant. New adaptation and risk reduction methods may be acquired through education programmes. Research has also shown that people with high education levels have better resilience capacity compared to those who have low education levels.
Emergency facilities ^{2,11,13-18}	<ul style="list-style-type: none"> Emergency housing Emergency finances/ incentives Emergency medical care Evacuation plans Search and rescue 	The availability of emergency facilities implies better preparation for when emergencies due to climate extreme events affect people and other facilities. When there are adequate and well-functioning emergency measures, there is greater improvement in resilience and reducing vulnerability.
Basic services ^{3-5,11,12,19,20}	<ul style="list-style-type: none"> Adequate housing Transport Basic resources (e.g. water) Vulnerability assessments Infrastructure (e.g. roads and bridges) 	Adequate and well-functioning service delivery in various areas ensures preparedness and therefore reduces social vulnerability. These may also help in the building of resilient communities.
Employment and income ^{3-5,11,17}	<ul style="list-style-type: none"> Economic development Social grants Diverse economic opportunities 	The provision and safekeeping of multiple employment and income facilities and opportunities would ensure resilience of communities and adds towards the reduction of social vulnerability. Employment and income better position people and communities to deal with some of the climate extreme events as this can afford them resources to mitigate and adapt to such events.
Funding ¹⁸	<ul style="list-style-type: none"> Funding Financial support 	The availability of internal and external funding ensures better recovery from and preparation for disasters and extreme events hence ensuring resilience building.

References

1. Woolf S, Twigg J, Parikh P, Karaoglou A, Cheab T. Towards measurable resilience: A novel framework tool for the assessment of resilience levels in slums. *Int J Disaster Risk Reduct.* 2016;16:280–302. <https://doi.org/10.1016/j.ijdrr.2016.08.003>
2. Ziervogel G, New M, Archer van Garderen E, Midgley G, Taylor A, Hamann R, et al. Climate change impacts and adaptation in South Africa. *Wiley Interdiscip Rev Clim Chang.* 2014;5:605–620. <https://doi.org/10.1002/wcc.295>
3. Füssel HM. Vulnerability: A generally applicable conceptual framework for climate change research. *Glob Environ Chang.* 2007;17(2):155–167. <https://doi.org/10.1016/j.gloenvcha.2006.05.002>
4. Füssel HM, Klein RJT. Climate change vulnerability assessments: An evolution of conceptual thinking. *Clim Change.* 2006;73:301–329. <https://doi.org/10.1007/s10584-006-0329-3>
5. Otto IM, Reckien D, Reyer CPO, Marcus R, Le Masson V, Jones L, et al. Social vulnerability to climate change: A review of concepts and evidence. *Reg Environ Chang.* 2017;17:1651–1662. <https://doi.org/10.1007/s10113-017-1105-9>
6. Birkmann J, Teichman K. Integrating disaster risk reduction and climate change adaptation: Key challenges-scales, knowledge, and norms. *Sustain Sci.* 2010;5(2):171–184. <https://doi.org/10.1007/s11625-010-0108-y>
7. Blaikie P, Cannon T, Davis I, Wisner B. *At risk: Natural hazards, people's vulnerability and disasters.* 2nd edition. New York: Routledge; 2004.
8. Zarafshani K, Sharafi L, Azadi H, Van Passel S. Vulnerability assessment models to drought: Toward a conceptual framework. *Sustainability.* 2016;8(6), Art. #588. <https://doi.org/10.3390/su8060588>
9. Nutters HM, Pinto da Silva P. Fishery stakeholder engagement and marine spatial planning: Lessons from the Rhode Island Ocean SAMP and the Massachusetts Ocean Management Plan. *Ocean Coast Manag.* 2012;67:9–18. <https://doi.org/10.1016/j.ocecoaman.2012.05.020>
10. Cutter SL, Barnes L, Berry M, Burton C, Evans E, Tate E, et al. A place-based model for understanding community resilience to natural disasters. *Glob Environ Chang.* 2008;18(4):598–606. <https://doi.org/10.1016/j.gloenvcha.2008.07.013>
11. Adger WN. Social and ecological resilience: Are they related? *Prog Hum Geogr.* 2000;3(24):347–364. <https://doi.org/10.1191/030913200701540465>
12. Begum RA, Sarkar MSK, Jaafar AH, Pereira JJ. Toward conceptual frameworks for linking disaster risk reduction and climate change adaptation. *Int J Disaster Risk Reduct.* 2014;10(PA):362–373. <https://doi.org/10.1016/j.ijdrr.2014.10.011>
13. Paterson J, Berr P, Ebi K, Varangu L. Health care facilities resilient to climate change impacts. *Int J Environ Res Public Health.* 2014;11:13097–13116. <https://doi.org/10.3390%2Fijerph111213097>
14. Loosemore M, Carthey J, Chandra V, Chand AM. Climate change risks and opportunities in hospital adaptation. *Int J Disaster Resil Built Environ.* 2011;2:210–221. <https://doi.org/10.1108/17595901111167097>
15. Perrucci DV., Vazquez BA, Aktas CB. Sustainable temporary housing: Global trends and outlook. *Procedia Eng.* 2016;45:327–332. <https://doi.org/10.1016/j.proeng.2016.04.082>
16. Wright CY, Garland RM, Norval M, Vogel C. Human health impacts in a changing South African climate. *S Afr Med J.* 2014;104(8):579–582. <https://doi.org/10.7196/samj.8603>
17. Thomalla F, Downing T, Spanger-Siegfried E, Han G, Rockström J. Reducing hazard vulnerability: Towards a common approach between disaster risk reduction and climate adaptation. *Disasters.* 2006;30(1):39–48. <https://doi.org/10.1111/j.1467-9523.2006.00305.x>
18. IPCC. Managing the risks of extreme events and disasters to advance climate change adaptation – SREX summary for policymakers. In: Field C, Barros V, Stocker T, Qin D, Dokken D, Ebi K, et al., editors.

A special report of Working Groups I and II of the Intergovernmental Panel on Climate Change. Cambridge, UK, and New York: Cambridge University Press; 2012.

19. Madzivhandila TS. The integration of climate change issues on local government planning processes of South Africa. *Mediterr J Soc Sci*. 2014;5:20. <http://dx.doi.org/10.5901/mjss.2014.v5n20p941>
20. Hahn MB, Riederer AM, Foster SO. The Livelihood Vulnerability Index: A pragmatic approach to assessing risks from climate variability and change – A case study in Mozambique. *Glob Environ Chang*. 2009;19:74–88. <https://doi.org/10.1016/j.gloenvcha.2008.11.002>