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Adaptive capacity: exploring the research frontier

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**Article type: Overview**

**Article title: Adaptive Capacity: Exploring the Research Frontier**

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### Abstract

In the past 15 years there has been rapid growth in research on adaptive capacity. This paper critically reviews this literature, describing changes in the field over time, and highlighting the new frontiers in research. It explains how research on adaptive capacity began and remains heavily influenced by a one-size-fits-all assets based theory that assumes that adaptation action is commensurate with the possession of capitals. It explains how this theory has been unable to explain how adaptation is actually practiced across diverse contexts and scaled. The paper then highlights new research, particularly that which extends analysis to include psycho-social and institutional dimensions applied at smaller scales of analysis. This shift recognizes and helps overcome the limits of traditional approaches to adaptive capacity, but the field still lacks approaches that can explain the relationship between adaptive capacity and adaptation outcomes. Drawing on findings from disaster risk reduction and behavioral science literatures, this paper outlines a framework comprised of six factors that better explain how capacity is translated and mobilized into action, namely: risk attitudes, personal experience, trust in and expectations of authorities, place attachment, competing concerns, and household composition and dynamics.

### Introduction

It is inevitable that people and places will need to adapt to the impacts of climate change. Even if atmospheric greenhouse gas concentrations are stabilized as promised in commitments made under the Paris Accord, there is already a commitment to some degree of climate change, with warming likely to be at least 2.6°C above pre-industrial levels.<sup>1</sup>

There is much we do not know about how people and places will adapt to climate change, and how effective these responses will be. Research on adaptation is based on too few empirical studies to build robust theories able to explain the drivers and constraints adaptation.<sup>2,3</sup> Given the paucity of

This is the author manuscript accepted for publication and has undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process, which may affect the final appearance of the article. Research on adaptation is based on too few empirical studies to build robust theories able to explain the drivers and constraints adaptation.<sup>2,3</sup> Given the paucity of as doi: 10.1002/wcc.487

1 empirical studies of adaptation, the adaptation literature has tended to rely on assessing capacity to  
2 adapt as a proxy for actual adaptation.

3 Adaptive capacity is defined by the IPCC as ‘the ability of a system to adjust to climate change’.<sup>4</sup> It  
4 relates to the factors that assist social systems to manage and adjust to changing environmental and  
5 socio-economic conditions. As well as being used as a substitute for understanding actually existing  
6 adaptation processes, assessments of adaptive capacity are also integral to understanding social  
7 vulnerability: for vulnerability is a latent condition that is a function of exposure to risk, sensitivity to  
8 risk, and the capacity to adapt to avoid, reduce, or capitalise on risk.<sup>5,6,7</sup>

9 For these reasons there is a growing body of research on adaptive capacity. By way of evidence, a  
10 search in Scopus for articles with ‘adaptive capacity’ in the title, and ‘climate’ in the title, abstract or  
11 key words reveals 282 articles, beginning with Yohe and Tol’s influential article in 2002<sup>8</sup>, reaching 10  
12 articles for the first time in 2009, and growing to 59 articles in the first 11 months of 2016. A review  
13 of this research is timely, not least because there has been a movement in the field in recent years  
14 that is pushing the frontiers of knowledge in new ways, yet which many researchers have failed to  
15 appreciate so that they continue to use dated explanations and methods. Our aim here is to provide  
16 such a review, charting the evolution of the field, describing the increasingly sophisticated theories  
17 that have been applied, and providing a framework to guide further research that seeks to advance  
18 knowledge about adaptive capacity at smaller scales of analysis.

## 19 First generation theory and method

20 As initially proposed, the concept of adaptive capacity has its roots in Sen’s capabilities theory and  
21 the sustainable livelihoods assessments that were subsequently developed in the 1980s and  
22 1990s.<sup>9,10,11</sup> When applied to climate change, this theory explains capacity to adapt as a function of  
23 entitlements to material assets and social opportunities, where more entitlements is read as more  
24 capacity to adapt to climate change, and fewer entitlements is read as greater vulnerability.<sup>12,13</sup> For  
25 example, the IPCC’s Third Assessment Report states that ‘those with the least resources have the  
26 least capacity to adapt and are the most vulnerable.’<sup>4</sup>

27 There is no single method to assess adaptive capacity following this theory, and studies apply  
28 different factors and indicators to capture the outcomes of entitlement processes, making it difficult  
29 to compare adaptive capacity across studies.<sup>14</sup> Nonetheless, the five capitals used to assess  
30 sustainable livelihoods tend to most often be used as the basis for assessing adaptive capacity,  
31 namely access to:

- 32 • *Natural capital* to provide the natural resources necessary to sustain a livelihood to adapt (such  
33 as land, water, vegetation for farming practices);<sup>9,15</sup>
- 34 • *Physical capital* to provide the necessary infrastructural support (such as roads and irrigation)  
35 and technological solutions to impacts;<sup>16,17</sup>
- 36 • *Financial capital* to pay for adaptation;<sup>8,18</sup>
- 37 • *Social capital* to provide the social bonds and networks to assist adaptation;<sup>19,20,21</sup>
- 38 • *Human capital* to provide the physical and mental resources to adapt (education and health)<sup>22,23</sup>

39 These five capitals form the basis of what is sometimes called ‘generic’ adaptive capacity - the  
40 factors required to adapt to a (generic) range of threats.<sup>24</sup> Additional factors to explain generic  
41 adaptive capacity sometimes include *institutions, governance, and access to knowledge* as these  
42 address the information and process whereby entitlements are activated and adaptation is  
43 practiced.<sup>10,25,26,27,28</sup>

44 One of the challenges with the first generation of adaptive capacity studies is their application across  
45 diverse scales and risks, as Katherine Vincent was quick to note.<sup>12</sup> Capabilities based theory and  
46 associated methods apply most meaningfully to households, and have diminishing explanatory  
47 power when applied to progressively larger institutions: thus it may have some relevance when

1 applied to small villages, and very little relevance when applied to countries. It may also explain little  
2 about the behavior of different individuals within households whose actions shape the particular  
3 adaptations of any given household institution. Further, adaptation is perhaps not well understood  
4 as a generic task but rather as specific actions in response to specific risks.<sup>24</sup> Therefore, assessments  
5 of generic capacity applied across large areas or to diversely scaled institutions may explain very  
6 little.

7 Nevertheless, assessments of generic adaptive capacity across broad spatial scales using aggregate  
8 indicators are common.<sup>26,29,30,31,32,33</sup> This is a tradition of research that began when international  
9 climate change negotiations were concentrating on defining global measures to understand the  
10 extent of the climate threat and on galvanizing political action to reduce climate vulnerability.<sup>34</sup> This  
11 created a demand for adaptive capacity assessments at national and global spatial scales, which  
12 have since continued apace.

13  
14 Many assessments of adaptive capacity at large scales use aggregated and secondary forms of data  
15 such as Gross National Income (to demonstrate wealth), regional literacy rates (to demonstrate  
16 education), government health expenditure (to demonstrate institutional stability), and infant  
17 mortality rates (to demonstrate human capital). The indicators used to inform these assessments are  
18 typically weighted equally to establish an index of adaptive capacity.<sup>35,36,37,38,39</sup> Adaptive capacity can  
19 then be mapped at large spatial scales (regional, national and international) and used to classify  
20 social systems using a simple set of categories (such as high, medium or low capacity). This approach  
21 is comparable to that of the Human Development Index, and indeed many other indexes, which all  
22 suffer from the same sorts of criticisms concerning subjective criteria for weighting, redundancy  
23 among variables, and the unsuitability of such measures for making and measuring policy.<sup>40,41,42</sup>  
24 Whilst highly salient in policy, the reliance on large scale aggregated data means that these  
25 assessments are not sensitive to the differential, context-specific nature of adaptation, and as such  
26 they obscure more than they show the differences in places and communities.<sup>43</sup>

27 Perhaps the most important limitation of these first generation assessments of adaptive capacity is  
28 the theoretical assumption that capacity translates into action. This is an assumption that remains to  
29 be properly tested. There are indeed many studies of responses to current or past stresses as a  
30 proxy to understand adaptation which suggest that adaptation practices arise from far more  
31 nuanced and relational processes in which stocks of assets are not the only or the most important  
32 explanatory variable.<sup>5,44,45</sup> Some of these studies assess the effectiveness of initiatives to alleviate  
33 vulnerability and most conclude with recommendations for adaptation that correspond with  
34 sustainable development goals.<sup>46,47,48,49,50</sup>

35 Importantly, a few studies show that higher capacity households are not adapting as well as  
36 households with lower capacity.<sup>19,44,51</sup> For example, in a study in Northern Burkina Faso, Nielsen and  
37 Reenberg found that households from the traditionally disadvantaged ethnic group *Rimaabe* were  
38 adapting better than the *Fulbe*, an ethnic group with traditionally higher social standing and wealth.  
39 The *Rimaabe* engaged in multiple livelihood strategies which enabled adaptation whereas the  
40 cultural values of the *Fulbe*, such as valuing living in isolation in the bush rather than the village,  
41 constrained their adaptation.<sup>51</sup> Likewise, a study of artisanal fisheries in South India demonstrates  
42 that the most vulnerable households were not those that were poorest, but rather wealthier  
43 households that were dependent on fishing as their single livelihood strategy.<sup>44</sup>

44 Research in developed countries also demonstrates that adaptation is not occurring in places where  
45 the theory of adaptive capacity suggests adaptation it should.<sup>52,53,54,55</sup> For example, an extensive  
46 review of over 300 examples of adaptation in the United Kingdom found that over half of the  
47 adaptations were research activities which demonstrated an investment into the intention to adapt  
48 rather than adaptations *per se*.<sup>16</sup> Ford and colleagues came to similar conclusions in their review,  
49 arguing that adaptation in developed countries is heavily constrained due to a lack of political will to

1 address climate change and an apparent 'mismatch between national statements and local action'.<sup>56</sup>  
2 In Australia Waller and Barnett argue that adaptation is the subject of rhetoric more than action,  
3 and that investments in research dominate, because these enable hard decisions to be deferred.<sup>57</sup>  
4 Restrictive institutional mechanisms and low political will have been identified as significant barriers  
5 to adaptation in the USA, leading Moser to argue that the USA is 'ill-equipped' for climate change  
6 adaptation despite 'assumptions that developed nations like the U.S. face relatively low vulnerability  
7 and possess high adaptive capacity'.<sup>54</sup>

8 So, if people with seemingly low adaptive capacity are adapting, and people with high adaptive  
9 capacity are not adapting, then the relationship between adaptive capacity and adaptation is far  
10 from direct, and theories and evidence that can better explain the association are required.

11 Two empirical studies explicitly assess adaptation alongside adaptive capacity such that they can  
12 examine the extent to which capacity explains adaptation.<sup>58,59</sup> Grothmann and Patt propose a Model  
13 of Private Proactive Adaptation to Climate Change (MPPACC) which draws on Protection Motivation  
14 Theory<sup>60,61</sup> to assess a range of socio-cognitive factors (such as perceptions of climate risk and  
15 adaptation options, cognitive biases). What is significant about this study is that the authors found  
16 that the MPPACC approach was fairly effective in explaining adaptation, and that it was more  
17 effective than basic socio-economic measures comparable to traditional adaptive capacity  
18 assessments. This assessment departs significantly from traditional approaches to assessing adaptive  
19 capacity, re-orienting the assessment from a top-down structural approach to an understanding of  
20 adaptation that is contingent on social values and individual perceptions.

21 Similarly, Truelove and colleagues systematically examine the extent to which a formal approach to  
22 assessing adaptive capacity is effective in explaining the adaptation intentions of rice paddy farmers  
23 in Sri Lanka.<sup>58</sup> In this study the researchers apply a Risk, Coping and Social Appraisal (RCSA) model of  
24 adaptation decision-making (which includes drought risk perceptions, efficacy beliefs, village  
25 identification and perceived social norms) alongside an assessment of assets and demographic  
26 factors (consistent with traditional adaptive capacity models). Like Grothmann and Patt, they found  
27 that their psycho-social model was more explanative of people's intentions to adapt than the assets  
28 and demography model. Indeed, they found that efficacy beliefs were the strongest predictor of  
29 adaptation intentions.

### 30 The second generation: from assets to mobilisation

31 It seems then that asset based theories and methods are insufficient to explain or anticipate  
32 adaptation. There is a gap between capacity and action that requires greater understanding, and  
33 new research has been advancing this by focussing is on the factors that mobilise capacity such that  
34 change is enacted.

35 This shift to focus on mobilising capabilities is captured in the definition of adaptive capacity by  
36 Nelson et al, as the 'preconditions necessary to enable adaptation, including... the ability to mobilise  
37 these elements'.<sup>62</sup> They contend that adaptive capacity must be activated or translated into action  
38 through social or biophysical triggers. Pelling and High likewise acknowledge the difference between  
39 latent capacity and mobilising capacity.<sup>21</sup>

40 Much of the focus of this research is on psycho-social factors. Gifford and colleagues provide a  
41 comprehensive review of various theoretical frameworks, such as protection motivation theory, the  
42 theory of planned behaviour, the theory of reasoned action, the norm activation model, and value-  
43 belief-norm theory.<sup>63</sup> They contend that no model seems sufficient to account for the complexity of  
44 behaviour, but they all demonstrate the importance of psycho-social factors as elements of adaptive  
45 capacity.

1 A number of studies focus on the psycho-social attributes necessary for adaptation.<sup>64,65,66,67</sup> For  
2 example, Jain and colleagues examine perceptions of weather variability and risk taking behavior  
3 alongside assets-based components of capacity.<sup>64</sup> Marshall and colleagues assess Australian farmers'  
4 perceptions of risk and uncertainty, skills for planning, ability to cope with change, and their interest  
5 in change.<sup>65,66</sup> Grothmann and Patt examine risk perception and also perceived adaptive capacity,  
6 arguing that individuals' self-efficacy and assessment of the costs and efficacy of adaptation options  
7 needs to be considered in assessments of adaptive capacity.<sup>59</sup> Other studies examine the role of  
8 trust in government.<sup>67</sup> In each of these studies the interpretation of adaptive capacity is not so much  
9 about assets or resources but rather attributes that enable social systems or actors to adapt. These  
10 studies are important contributions, but they are constrained by a lack of evidence of adaptation,  
11 and this lack of evidence on the dependent variable limits their ability to test explanations of the  
12 capacity-adaptation relationship. Nevertheless, they point to a new frontier in research on adaptive  
13 capacity, that focuses on psycho-social factors, often applied in cases of adaptation to specific rather  
14 than generic risks.<sup>24</sup>

15 One way of overcoming the limitations of existing research, and to advance this new second frontier  
16 in adaptive capacity research, is to draw on studies from other disciplines. The wealth of empirical  
17 studies in the disaster risk reduction and behavioral science provide insight into why social systems  
18 might not prepare and respond well to extreme events despite seemingly high adaptive capacity.  
19 There have been moves to integrate this learning but it remains on the periphery of adaptation  
20 scholarship.<sup>68,69,70,71</sup> Assuming disaster management can be taken as an analogue for climate change  
21 adaptation, this research can help advance understanding of the capacity-adaptation relationship.  
22 Working from this assumption, our comprehensive review of studies on household action in  
23 response to extreme events points to several important mobilising factors that help explain why  
24 households do not apply their capacity to adapt, or why households with little capacity still manage  
25 to adapt effectively. We focus on households as this is at this scale in which climate risks are often  
26 most acutely experienced, and they are a critical locus of decision-making around adaptation.<sup>72</sup> The  
27 mobilising factors now discussed are by no means a definitive list, but it is hoped that they will help  
28 to advance theorizing and further research about the capacity-adaptation relationship.

## 29 **Risk attitudes**

30 Risk attitudes consist of the ways in which individuals perceive the probability and severity of  
31 climate risk (risk appraisal), the way in which they perceive their capacity to perform those options  
32 (self-efficacy), the perceived costs and benefits associated with adapting (adaptation appraisal), and  
33 cognitive biases such as wishful thinking, denial, fatalism (avoidant maladaptation).<sup>73,74</sup> Perceptions  
34 of risk and self-efficacy play an important role in shaping individuals' engagement with adaptation  
35 and disaster risk reduction.<sup>75</sup> Distorted beliefs in people's own ability to manage climate stress and  
36 impacts can be a barrier to adaptation.<sup>76</sup> In a study of the elderly and their responses to heat wave  
37 risk in the UK, Wolf and colleagues found that elderly respondents acknowledged that elderly people  
38 were vulnerable to heat waves but they did not personally identify themselves as old or  
39 vulnerable.<sup>77</sup> Respondents' distorted perception of their self-efficacy was associated with low uptake  
40 of self-protection measures, leading to exacerbated vulnerability during heat wave events.

41 The gambler's fallacy is a good example of a cognitive bias that affects individuals' assessment of the  
42 probability of a climate risk or natural hazard, in which an individual reasons that if an event has  
43 occurred recently then it is unlikely to reoccur in the immediate future.<sup>78</sup> The normalization bias  
44 demonstrates how cognition can influence an individual's assessment of their ability to cope with  
45 climate impacts. An individual who has coped with minor cyclone impacts, for example, may infer  
46 that they are able to deal with future cyclones to the extent that they may disregard disaster  
47 warnings.<sup>79</sup> Optimism bias describes a cognitive process in which people underestimate the  
48 likelihood of negative events affecting them personally, to the extent that they do not take adequate  
49 protective measures.<sup>80,81,82</sup> Wishful thinking, denial, and fatalism can also be very powerful

1 constraints to individual action in response to climate risks. In the wildfire literature attitudes such  
2 as 'it won't happen to me' (denial and wishful thinking) or 'it will go up in flames anyway so why  
3 bother' (fatalism) have been identified<sup>83,84,85</sup> and provide some indication as to how households  
4 might be failing to adapt to known climate risks. Drawing on these studies, it is easy to imagine an  
5 individual with high capacity that does not adapt to known climate risks because they simply don't  
6 believe they are exposed to the risk. Likewise, we can imagine someone with a high level of concern  
7 about climate risk who prioritizes adaptation investments despite their low capacity.

## 8 **Personal experience**

9 Personal experience of climate risks and hazards is a significant factor shaping individual risk  
10 perception, although the nature of that influence is contested. Some studies demonstrate that  
11 previous experience of a hazard increases people's preparations;<sup>86,87,88</sup> other research suggests that  
12 experience decreases preparations;<sup>89,90,91</sup> and one study finds no correlation between experience  
13 and preparedness.<sup>82</sup> Mortreux and Barnett find an association between length of time spent in a  
14 climate risk area and risk perception, with older Tuvaluans drawing on past experience to inform  
15 their perceptions of climatic change.<sup>92</sup> Gow's study of wildfire preparedness suggests that it is the  
16 physical closeness and intensity of hazard experience that influences preparedness, with more  
17 intense experiences resulting in higher preparedness levels.<sup>93</sup> Likewise, a case study of household  
18 adaptation to flood risk in Guyana and Suriname found that lower income households were more  
19 engaged in adaptation compared to wealthier households as they had incurred damage to their  
20 housing and health from past flood events.<sup>21</sup> Elsewhere however, the intensity of previous  
21 experience has been shown to reduce preparedness, where people become fatalistic and feel that  
22 no action could prepare them for what they regard as a random and uncontrollable risk. This was  
23 found to be a significant reason for inaction for wildfires in Michigan<sup>89</sup> and in Western Canada,  
24 despite the seemingly high adaptive capacity of these communities.<sup>94</sup> The time that has passed since  
25 the hazard experience is also important, with preparedness levels increasing immediately after the  
26 event but returning to lower levels after a few years.<sup>80</sup> This is concerning given that hazard risks  
27 often reduce immediately after a risk and increase again several years later (flood and cyclone  
28 events usually have a lengthy return period, and wildfire events worsen where vegetation has had  
29 time to grow back).

30 In summary, it is difficult to conclude from the literature what influence previous experience has on  
31 adaptation, however, it is clear that in some cases it can impede adaptation. Personal experiences of  
32 hazards or climate risks are more likely to become a barrier to adaptation where the experience was  
33 not very intense such as near-miss experiences,<sup>91</sup> where the experience was a number of years in  
34 the past,<sup>80</sup> and where the experience was so intense that people felt they had little or no control  
35 over the situation.<sup>89,94</sup> People's capacity may remain fairly static over time, however their  
36 commitment to adaptation might change substantially depending on their changing experiences and  
37 interpretations of climate risks.

## 38 **Trust and expectations in authorities**

39 A number of institutional constraints to adaptation have been identified.<sup>95,96</sup> A lack of trust in  
40 authorities has been associated with low levels of household adherence to advice from authorities  
41 regarding basic preparations for known hazards.<sup>97</sup> Conversely, high levels of expectations of  
42 institutions and a belief in the capacity and responsibility of authorities to protect properties have  
43 been found to result in lower levels of household adaptation.<sup>98</sup> O'Neill and Handmer's analysis of  
44 fatalities from the Black Saturday wildfires in Victoria, Australia, shows that a number of individuals  
45 were waiting for a direct warning from fire authorities before deciding to evacuate, suggesting  
46 complacency and a deferral of responsibility to trusted authorities.<sup>85</sup> It should be noted that this  
47 complacency occurred in relatively wealthy communities where adaptive capacity is seemingly high  
48 based on standard measures.

1 The lessons from the empirical studies in the wildfire literature can be extended to the way in which  
2 households are likely to adapt to known climate risks. The literature indicates that the relationship  
3 between communities and authorities is fraught. It is difficult to achieve a culture of trust in  
4 authorities that avoids community complacency about wildfire risk. With the exception of one study  
5 of over-zealous homeowners,<sup>99</sup> complacency in adapting to wildfire risk seems to be the dominant  
6 response, either because communities place too much trust (and expectations) in authorities, or  
7 because communities do not trust authorities enough to comply with advice.

## 8 **Place attachment**

9 In environmental psychology and geography, place attachment describes the emotional ties  
10 individuals have to specific places.<sup>100,101,102,103,104</sup> Time spent living in that place, identification with  
11 the broader community, and dependence on natural resources found in that place are several  
12 factors seen to influence emotional ties to place.<sup>105,106</sup> The economic and social factors that 'root'  
13 someone to a particular place are particularly important.<sup>106,107</sup>

14 The adaptation literature has tended to frame place attachment as 'inherently positive' with little  
15 suggestion that 'one can be excessively attached to a place'.<sup>103</sup> The literature has examined how  
16 climate change poses risks to communities that are emotionally tied to specific places, such as the  
17 psychological risks that relocation poses for communities living on coral atolls.<sup>108,109</sup> The literature  
18 also examines the importance of 'bringing climate change home' so that climate risk is made  
19 relevant to people in the places they value rather than being perceived with moral and psychological  
20 distance.<sup>110,111</sup> Elsewhere the adaptation literature suggests that place attachment may play an  
21 important role in motivating people to act on climate change.<sup>112</sup> For example, in a study on  
22 responses to cyclones and flooding in Queensland, Australia, Marshall and colleagues find that those  
23 fishermen and tourism operators with strong attachment to place were more likely to plan for  
24 extreme events. This was linked with their occupational dependence on natural resources.<sup>113</sup>

25 In contrast, the disaster risk reduction literature demonstrates that attachment can act as a barrier  
26 to household preparation for known hazards. Again, using the example of wildfire, people's desire  
27 for a private home tucked away in forest, often on scenic ridge lines, heightens the risk of wildfire,  
28 yet for many homeowners this risk is justified because they value living in these places and are  
29 attached to the lifestyles they offer.<sup>114,115,116</sup> Emotional attachment to trees and other landscape  
30 features may prevent people from removing trees close to their house, even if they pose significant  
31 risk in a wildfire. There may be conflict between wildfire risk reduction aims and other needs, such  
32 as planting or keeping trees close to houses to provide shade and windbreaks.<sup>116</sup>

33 This literature also speaks to the importance of financial investment and housing status in shaping  
34 how households prepare for wildfires. A number of studies find that homeowners are far more likely  
35 to take actions to protect their homes from wildfire than rental-occupiers.<sup>98,106,117</sup> These findings  
36 could be taken to support the theory that high adaptive capacity leads to higher adaptation,  
37 however, financially invested homeowners may also put themselves at risk in order to save their  
38 property. Home-owners may regard their home as a 'physical expression of self, of achievement, of  
39 one's way of life'<sup>118</sup> and a study by Harries suggests that the desire to feel secure within this  
40 construct of 'home' may be so strong that people overlook actual risks to their physical security.<sup>119</sup>

## 41 **Competing concerns**

42 The presence of competing concerns can be a major barrier to adaptation. In the psychology  
43 literature, Linville and Fischer describe that people have a limited capacity to worry such that  
44 increases in worry about one issue in life will lead to a decrease in worry about other issues.<sup>120</sup>  
45 Ziervogel's study of South Africa is a good example of this in which the community faced multiple  
46 stressors: water shortages, unemployment, sanitation and flood impacts along with HIV/Aids, and

1 other diseases.<sup>121</sup> It is understandable that in the midst of significant stressors, adapting to climate  
2 change is not a priority, particularly given climate change is regarded as something that will happen  
3 in the future, and so is discounted heavily.<sup>92</sup> In wealthier industrialized contexts, household concerns  
4 may seem slight in comparison, nonetheless worry is relative to people's lived experience, and  
5 stressors such as mortgage repayments may be sufficient to decrease worry about known hazards  
6 and climate risks. Eriksen and Gill found, for example, that women are less likely to be involved in  
7 wildfire preparedness as they often have multiple responsibilities (looking after children, domestic  
8 work, paid work), and so have less time and energy to commit to household wildfire preparation.<sup>116</sup>  
9 The literature suggests then that the presence of competing concerns significantly constrains  
10 adaptation, even where households may have relatively high adaptive capacity.

## 11 **Household composition and dynamics**

12 Household composition and dynamics have not been considered as a possible barrier in the  
13 adaptation literature, however, there are studies in the DRR literature that suggest that the  
14 dynamics within a household - how decisions are made, and adaptation actions performed or carried  
15 out - can to some extent explain household adaptation. The presence of children within a household  
16 is associated with higher levels of hazard preparedness.<sup>122</sup> Gender has been found to be a good  
17 predictor of people's attitudes towards natural disasters.<sup>123,124,125</sup> Wildfire preparations are largely  
18 regarded as "men's business" in which women are less likely to be involved and less empowered to  
19 take defensive action during fire events.<sup>124</sup> Differences in opinion within households about how to  
20 respond to wildfire, including decisions about when to evacuate, are often gendered and may lead  
21 to serious disagreements both in preparation stages and as fire approaches. It is reasonable to  
22 conclude from the literature that household composition and dynamics can, in some cases, act as a  
23 barrier to adaptation. Differences of opinion within and between households about how to manage  
24 known climate risks may constrain adaptation by delaying or preventing important decisions. Having  
25 children in a household may increase the attention households pay to adaptation, although it is also  
26 possible that it would reduce action due to competing concerns.

27 The five factors reviewed here help to explain why high capacity social systems may resist  
28 adaptation, and why low capacity systems may adapt well despite having a low resource base. This  
29 attention to mobilizing capacity provides a strong starting point for developing a deeper  
30 understanding of adaptation that can extend first generation assessments of adaptive capacity.  
31 Where asset-based capacity components are seen to assist social systems in adapting, the factors  
32 identified here interfere with the capacity-adaptation relationship. We can imagine individuals  
33 within a household, for example, who perceive there to be little climate risk, who hold high levels of  
34 trust in authorities to manage whatever risk there is, and who have little time to engage in simple  
35 activities to adapt to known climate risks. This household may have very high levels of adaptive  
36 capacity based on standard measures, yet not be adapting.

## 37 **Conclusion**

38 Adaptation is a complex social phenomenon in which climate risk is negotiated and acted upon in  
39 diverse social and environmental contexts. This complexity confounds theories of adaptation, with  
40 many researchers instead focusing on adaptive capacity, and assessing it using aggregated data  
41 across large scales. Whilst there is little evidence to compare adaptive capacity with actual  
42 adaptation outcomes, that which does exist does not support the assumption that systems with  
43 high adaptive capacity will adapt well, and that systems with low adaptive capacity are more  
44 vulnerable.

45 A second wave of research on adaptive capacity is highlighting the way psycho-social factors  
46 influence the ways in which assets are (and are not) mobilized to affect adaptation actions. This  
47 paper has drawn from wider literatures to help consolidate understanding of these mobilizing

1 factors at the household scale, showing that risk attitudes, personal experience, trust and  
2 expectations of authorities, place attachment, and competing concerns all influence adaptation  
3 actions in important ways. Further empirical research is necessary to understand the relationship  
4 between adaptive capacity and adaptation, the conditions under which systems are most likely to  
5 apply their capacity to adapt, and the extent to which mobilising factors, such as those highlighted in  
6 this paper, are helpful in understanding adaptation.

7

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