

Perceptions matter: household adaptive capacity and capability in two Australian coastal communities

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by each local government authority. Hand delivery was also undertaken by members of the research team to increase the rate of survey return and reduce non-response bias. The distribution of returned postal surveys in each suburb was examined to establish hand-delivery targets that ensured proportional representation of households across each study area. Within the target suburbs, streets were randomly selected and every 5th house was approached to ask their willingness to participate in the survey. If the household declined, the adjoining property was targeted. If the household accepted, the 5th adjoining property was approached. Four hundred completed surveys were returned (a response rate of 10% for postal and 30% for hand delivered surveys). The return sample provided an acceptable relative standard error of 5%, following Krejcie and Morgan (1970) (population size of 79,178 and sample size of 400). Household perceptions of access to general determinants of capacity, past exposure to environmental hazards, capacity needs and perceived vulnerability were obtained in the survey, which contained open-ended and pre-defined closed-ended questions. Open-ended questions provided respondents the opportunity to identify: hazards to which the household is most vulnerable, the generic or specific capitals they find most supportive when preparing for environmental hazards and resources previously adopted and/or currently required to take action.

As climate change can be difficult for people to conceptualise and relate to daily activities (Lorenzoni and Pidgeon 2006), the survey referred to environmental hazards to capture the full range of climate impacts in the communities (Elrick-Barr et al. 2015). Environmental hazards were defined as ‘either everyday or extreme events or situations that may harm people property, settlements or environments, for example, bushfire or flood, or sea-level rise’. The pre-defined determinants of capacity aligned to the capitals framework (e.g. financial, social, human, physical, and natural capital). While the capitals framework has traditionally been applied in developing countries where the relevance and salience of capitals to livelihoods is different to that of developed countries (Elrick-Barr et al. 2015), the framework, or elements of it (e.g. financial, social, human, environmental, physical capital) are also applied in developed countries to assess social vulnerability and capacity (e.g. Arthurson and Baum 2015; Baum 2008; Nelson et al. 2010a; Nelson et al. 2010b). Chi-squared (χ^2) non-parametric tests were conducted to analyse differences in access to determinants of capacity and perceived capacity needs to respond to environmental hazards. In doing so we sought to examine whether access to generic or specific determinants of capacity influence perceptions of capability. Association between variables was assessed applying Cramer’s V (ϕ_c). The significance of results was assessed at the 0.05 confidence level.

2.3. Semi-structured interviews

Household characteristics (e.g. income, family type, education, home ownership and age) of the 46 respondents that agreed to participate in an interview were profiled to select those that represented diverse types. Of those, 31 were contacted and 17 agreed to participate in the interview (8 in Mandurah; 9 in Moreton Bay), one declined to participate and thirteen did not respond to requests for participation (involving at least three follow-ups in each case). As interviews progressed the generation of new information was reviewed. At the point where similar themes recurred (e.g. no new information provided) interviews ceased and follow-ups with additional participants were abandoned.

Hazard type and severity can influence views on the need for additional support. Therefore, perceptions of capability were examined for three hazard scenarios: two scenarios represented climate hazards likely previously experienced (i.e. heatwave and severe storm) and a third represented a hazard to which communities are vulnerable (DCCEE 2009) but with which they have less direct experience (i.e. sea-level rise). In the following sections we term these hazards ‘familiar’ and ‘novel’ climate hazards, respectively. Household representatives described the impact the hazard scenarios would have on their household (Table 1), actions to respond and their capacity to enact the response.

Interview responses were transcribed verbatim, coded by question and analysed in NVIVO. Thematic analysis was undertaken to identify key words and phrases and sort and categorise the data to create ordered concepts. Analytically, the approach adopted is derived from the interpretive tradition, developing themes through an iterative process (Yanow and Schwartz-Shea 2006). Themes were

reviewed and dominant narratives of capability were identified. In the section that follows, quotes indicative of the themes identified are presented.

Table 1: Scenario hazards presented to interviewees

| |
|---|
| <p>Severe Storm: A severe summer storm hits [Moreton Bay/Mandurah]. Storm impacts include high winds, loss of power, localized flooding, fallen trees and damaged power lines. Power is out until midday the following day and you experience minor roof damage, which results in limited water damage in the living room of your home.</p> <p>Heatwave: There is a heat wave in [Mandurah/Moreton Bay]. The impacts include health issues such as heat stress, water restrictions, trouble sleeping at night, and limited opportunities for outdoor recreation. During the heat wave, your household has a power blackout that lasts for several hours.</p> <p>Sea-level rise (SLR): SLR in [Mandurah/Moreton Bay] creates gradual inundation in low-lying areas and will occur incrementally over time. SLR can also exacerbate coastal erosion through raised water levels that affect higher areas of the coastal dune. SLR may result in some areas of the region being 'cut-off' from others where roads and services are located in low-lying areas. In addition, there may be instances of damage to infrastructure located in low-lying areas or on the coastal fringe.</p> |
|---|

3. Results

Perceived capacity needs are first compared with measurable access to capacity and then the narrative of capability to act as expressed by interviewed households is presented.

3.1 Measureable access to capacity and perceived capacity needs

Of the 400 surveyed households, 120 had experienced some form of environmental hazard in their current location and 83% of those stated they required no external support to respond. This was despite variation in access to generic determinants of capacity (e.g. income, home-ownership, family type, age). The lack of need for external support could be a function of high levels of existing capacity; therefore, households rated their perceived access to generic determinants. Differing perceptions of access to various capitals corresponded to household income level, whether the household had dependent children, were elderly or owned their own home (Table 2). For example, respondents in rental accommodation considered their access to financial, physical and social capital less positively than respondents that owned their own home. In addition, household perceptions of the forms of capacity most effective in aiding preparatory action differed. Households with less perceived financial capacity considered social (i.e. advice from family members: $\chi^2=49.54$, $p < 0.01$), institutional (i.e. government incentive schemes: $\chi^2=36.29$, $p < 0.01$) and human capacity (i.e. previous experience managing the hazard: $\chi^2=27.08$, $p < 0.05$) more effective forms of support for preparatory action than households with higher perceptions of their own financial capacity (although associations were weak, $\phi_c < 0.2$). Yet despite variation in measurable and perceived access to generic capacity, perceived capacity needs to respond to environmental hazards remained low.

Table 2: Perception of access to generic capacity by household characteristic

| Determinant of Generic Capacity | Homeownership | Family Type | Income | Age |
|---|---|---|---|--|
| We can usually meet all of our households essential expenses (financial capital) | $\chi^2 = 30.7$ (df 8), $p < 0.01$ Households in rental properties | $\chi^2 = 28.24$ (df 16), $p < 0.05$ One parent families with children and share or extended family households | $\chi^2 = 25.13$ (df 12), $p < 0.05$ Low income households | - |
| There are people or groups we can rely on for financial support (financial capital) | - | - | - | $\chi^2 = 15.8$ (df 8), $p < 0.05$ Respondents >40 years |
| There are people or groups we can rely on for personal support (social capital) | - | - | - | $\chi^2 = 29.28$ (df 8), $p < 0.01$ Respondents >40 years |

| Determinant of Generic Capacity | Homeownership | Family Type | Income | Age |
|--|---|---|--------|---|
| We are able to access support services when needed (e.g. support for parents, young people, people with disability) (social capital) | $\chi^2 = 16.13$ (df 8), $p < 0.05$ Households in rental properties | $\chi^2 = 33.67$ (df 16), $p < 0.01$ Share or extended family households | - | - |
| There are enough opportunities to be involved in local activities that are important to us (e.g. social, sporting or political) (social capital) | $\chi^2 = 16.22$ (df 8), $p < 0.05$ Households in rental properties | $\chi^2 = 27.81$ (df 16), $p < 0.05$ Share or extended family households | - | - |
| The services and facilities in our local area (hospitals, schools, roads) are generally good quality (physical capital) | $\chi^2 = 16.13$ (df 8), $p < 0.05$ Households in rental properties. | $\chi^2 = 29.83$ (df 16), $p < 0.05$ Couples with children | - | - |
| There is good access to health and medical services when needed (human capital) | - | $\chi^2 = 41.35$ (df 16), $p < 0.01$ Single parent households | - | $\chi^2 = 30.5$ (df 8), $p < 0.01$ Respondents <65 years |
| There is access to a good range of education services (human capital) | - | $\chi^2 = 38.57$ (df 16), $p < 0.01$ Single person households | - | - |

^a The characteristic distinguishing the households based on perception of access is listed, signifying the group with most disagreement with the reference statement. Blank cells indicate no significant relationship between household characteristic and determinant of generic capacity.

Hazard type and severity can influence views on the need for additional support where households claimed little need for external support because the hazards they responded to in the past were not severe. The three hazard scenarios provided consistent events to compare reported capacity needs across households of differing socio-demographic characteristics. As with survey results, 75% of interviewees believed no additional capacity was required to respond to the hazard scenarios. Despite low perceived capacity needs to respond, responses indicate that capacity remains important because generic and specific capacities were drawn on when describing household response (Table 3). Existing capacities were however, considered sufficient to manage the risks despite variation in household socio-economic characteristics.

Table 3: Capacities to respond to hazard scenarios

| | Heatwave | Severe storm | Sea-level rise |
|--|--|--|--|
| Capacity to respond to scenario hazard | <i>Specific capacities:</i> Forecasts/information regarding the hazard; Home insulation or maintenance; Government subsidies. <i>General capacities:</i> Finance; Social capital (family or neighbours); Public resources (i.e. shopping centre); Geographic location | <i>Specific capacities:</i> Forecasts/information regarding the hazard; Home maintenance; Power generator, storm response kit; Experience <i>General capacities:</i> Social capital (family or neighbours); Human capital (health of family members); Insurance | <i>Specific capacities:</i> Information regarding the hazard; Government subsidies for green initiatives e.g. solar panels <i>General capacities:</i> Finance |
| Stated capacity needs | None (70%) Finance (12%); power (electricity) supply (12%); information on how to respond (6%) | None (76%) Social connections (family or neighbours) (12%), information (6%); technologies (e.g. radio, batteries) (6%) | None (76%)* Financial assistance (18%); information regarding the hazard (6%) |

^a * 65% of interviewees cited difficulty conceptualising the impacts of sea-level rise and consequently had difficulty defining adaptive responses and capacity requirements for the risk. Therefore, while no specific capacity requirements were mentioned by 76% of interviewees, this does not infer that households perceived that no capacity was required.

Together, the survey and interview data indicate perceived capacity needs are independent of objective determinants and regardless of the forms of capacity adopted (e.g. financial versus social), capacity is perceived sufficient to maintain household resilience.

While there was a general consensus that no additional capacity was needed, when survey respondents were asked what forms of capacity would aid household preparation for environmental hazards, existing knowledge and hazard information were identified as priorities (Table 4). There were however, differences in perceived utility of forms of capital based on the respondents past experience and tenure. Those that had experienced an environmental hazard in their current location rated existing knowledge ($\chi^2=10.16$, $p<0.001$), policies informing household action ($\chi^2=5.517$, $p<0.05$) and previous experience ($\chi^2=9.97$, $p<0.01$) as more valuable determinants of capacity for hazard preparation than households without hazard experience. While financial resources ($\chi^2=4.63$, $p<0.5$) and close social networks for advice on how to prepare and respond ($\chi^2=5.57$, $p<0.05$) were considered more important by households in rental accommodation than those that owned their own home.

Table 4: Capacities considered most effective in aiding hazard preparation

| Priority | Capacity |
|----------|--|
| 1 | Existing knowledge of the hazard |
| 2 | Access to information that explains the frequency, extent or condition of the hazards |
| 3 | Information from government agencies (local, state or emergency response) on what to do to prepare |
| 4 | Local policies instructing households on how to take action |
| 5 | Government incentive schemes that support preparatory action |
| 6 | Previous experience in managing the situation |
| 7 | Access to financial resources (such as savings or disposable assets) |
| 8 | Advice from family members, friends or colleagues on what to do to prepare |

Interview respondents also prioritised access to information as a key determinant of capacity to prepare for environmental hazards, on the basis that a lack of awareness and knowledge hindered the ability of households to act (their own and others). Government agencies were expected to provide such information; however, some doubt was raised regarding the likelihood that governments would provide accurate information on the nature of the risks faced.

So I think information is the big responsibility for the State at the moment. To get in early so that people are not taken by surprise and tell people what they need to know [to respond] [ID114]

I suppose seeking advice maybe from government websites, whether they would be honest enough to tell us what is going on I am not sure [ID206]

Despite the call for governments to provide information, respondents awareness of the actions that reduce vulnerability was rarely linked to information received through such sources. Rather, past experience of the hazard, knowledge obtained through practical or vicarious experience (often cited by elderly households), and/or social networks of support (talking to friends and neighbours, i.e. bonding networks) facilitated hazard response. For example, when reflecting on where she received information regarding hazard preparation, one respondent noted:

When we first moved to Mandurah we were not used to the weather. I relied on friends saying you have to tie things down and move them or they will be blown around. So they were my source of information. I suppose I could have found information if I looked but I didn't even think of it. People just spoke and I thought, 'oh god, really' [ID114]

3.2 Narratives of capability

The interviewed households expressed a strong narrative of capability to prepare for, and respond to, the familiar hazards (severe storm and heatwave). The narrative of capability was associated with the implementation of pragmatic responses to address the hazard scenarios; for example, tying down loose items in the yard upon receipt of storm warnings or staying indoors during peak heat periods.

All I would need is a phone to ring SES and I have always got food in the freezer and bread where you could have sandwiches. I really don't think I would be in too much panic. [ID307]

Na [we wouldn't need anything], cause it is pretty basic [ID292]

We would clean up and get on with it [ID 27]

Respondents drew on past experience and knowledge regarding the effectiveness of coping strategies to estimate capability to respond. For example, for the storm hazard scenario one respondent reported high capability on the basis that "... it is something we are used to dealing with all the time" [ID27]. Perceptions of the households capability to manage impacts were also associated with positive household traits, such as being organised, prepared and responsive to hazard warnings, for example: "I am fairly well organised I reckon" [ID307]. External support services available to households also provided a safety net, reinforcing perceptions of resilience. Several respondents made reference to an "...absolutely first class" [ID127] State Emergency Service (SES), regardless of whether they had previously drawn on their services. For example:

"All I would do is call the SES, we have a strong one down here. They are very well organised" [ID307]

"Our SES is pretty fantastic here: not that I have needed to use them previously" [ID275]

In instances where the ability of coping mechanisms to address the hazard scenario was considered limited, as per the novel hazard (sea-level rise), the narrative of capability ceased. Furthermore, limits to capability were reported regardless of hazard type and were associated with perceived limits to capacity. For example, households were argued to be responsible for hazard preparation and post hazard response "as much as possible" [ID307 & ID292]; households should be "as organised as they can" [ID275]; "people have to look after themselves to a degree" [ID127]. If the impacts of the hazard were considered severe, an expectation of external support in managing the impacts was evident. Furthermore, respondents suggested that households with low capacity (financial, human or social capital) required and were entitled to, government support to prepare for and respond to the hazards. For example, one respondent noted: "...the State could offer more support for people who don't have the financial resources to bounce back" [ID144].

Neither geographic location nor household characteristics impacted significantly upon household capability narratives. Rather, following the results of other studies (e.g. Bickerstaff et al. 2008; Hanson-Easey et al. 2013), respondents views on whether action could or needed to be taken were closely tied to perceptions of the role and scope of governance authorities in protecting the community. Demonstrative of this relationship, approximately 80% of interviewees claimed households were primarily responsible for preparing and responding to the familiar hazards. The allocation of responsibility to their own (and other) household(s) was accompanied by a perception that the hazard impacts were an inconvenience more than a serious concern. In contrast, for sea-level rise the dominant narrative was uncertainty in the nature and scale of the impacts as well as the response options available. For example when reflecting on how their household would respond to the sea-level rise scenario one respondent stated: "Oh, gee I don't know [what actions we would take]. [Sea-level rise] is a lot different to [storms and heatwaves] because it is an unknown... I am really worried about it happening but I don't know how it would affect us" [ID292]. In conjunction with uncertainty on impacts and response actions, government authorities were allocated primary responsibility for managing the threat of sea-level rise.

In most cases when interview respondents assigned themselves capable and responsible for familiar hazards, capability was considered a function of access to capacity compared to 'others' less able to act. In allocating others less able to act, generic capacities such as health, age, experience and social networks of support were identified as the elements that enabled their household to respond. For

example, health and stage in the life cycle was considered by one respondent to increase their capability to manage the impacts of the hazard:

We don't have babies we don't have elderly people and we are not sickly. We are healthy: we can handle [the impacts] without too much inconvenience [ID348].

However, view of others inaction was not only ascribed based on perceived capacity to respond but also a perceived willingness to engage in collective responsibilities. In contrast to the responsibility and agency of their own household, 'others' were argued not to take the required actions to prepare for hazards on the basis that they were unaware or place too much emphasis on government support. For example:

There are many houses around here that do not take the action required to prepare for storms by tying things down [due to a] lack of experience. I have been around for longer and I know the importance of taking these actions [ID344].

[Households] can make the effort, but a lot of people don't because they think they are safe. They don't maintain their houses in a good condition or check gutters or whatever. And if you have a neighbour like that you are just as much at risk [ID264].

Therefore, consistent with national investments in encouraging communities to become more self-reliant (Allen 2013; Kent 2009), respondents allocated their household and others primarily responsible for preparing and responding to climate hazards. The self-allocation of responsibility was accompanied by a view that 'other' households were not taking adequate responsibility. For example:

People have a good thing these days of not taking personal responsibility. We need to be as organised as we can [ID275].

We have a very bad tendency these days to blame someone else, but you have to take some responsibility for your own life.... To expect everyone on your doorstep in 10 minutes, I find pretty incredible. You see people on television that have very unrealistic expectations of what the emergency services can do [ID264].

The results indicate perceptions of capability are contingent on the perceived novelty of the hazard and expected responsibilities for hazard management. A narrative of capability dominates for familiar hazards such as severe storms and heatwaves. However, subtleties exist within this narrative where the provision of external services and support is expected if the severity of the event is beyond the coping capacity of the household. For novel hazards, a narrative of insufficient capacity and capability to respond dominates due to uncertainties regarding impacts, response options, and where responsibility and agency lie.

4. Discussion

At the outset of this paper we argued that despite evidence that perceptions of capability to act are important determinants of action, studies seeking to uncover local capacity for climate adaptation rarely seek the perspectives of those they are seeking to support. Rather, measurable determinants of capacity are adopted to identify those least able to respond. In turn, gaps in capacity are targeted to provide the means for action, while information is disseminated to raise the profile of climate risks and provide the environment in which action is deemed necessary. While such an approach targets normative perceptions of risk, it ignores perceptions of capability. By seeking to address capacity deficits, agents therefore implicitly assume providing access to capacity will increase perceived capability and action will occur. This study tested this assumption by considering whether neglecting to obtain household perceptions of capability and capacity reduces the utility of external interventions seeking to promote household action.

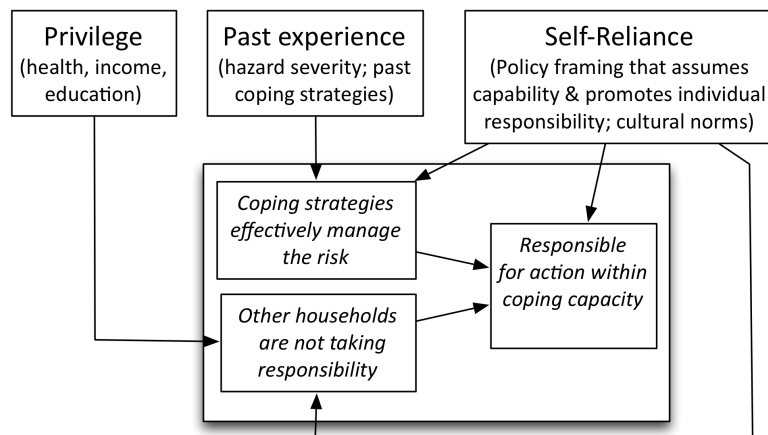
By distinguishing between perceptions of capability, perceived capacity needs and quantifying access to generic capacities, we found perceived capability does not directly relate to access to capacity. Rather, there can be a divergence between what households have and what they perceive is required to respond to climate hazards. Households may consider themselves capable of responding despite demonstrable differences in access to generic capacity. Further, households perceptions of the elements of capacity most helpful in aiding additional action (if and when deemed necessary) are not comparable to measurable gaps in access to generic capacity. For example, household income level did not explain differences in perceptions of finance as a barrier to action. Therefore, objective metrics of generic capacity may have limited utility for the assessment of adaptation needs and the prioritisation of related interventions.

Perceptions of capability, in contrast, highlight barriers to action beyond access to finance or other physical assets. In this case, a dominant narrative of capability to manage familiar hazards and low perceived capability to address novel hazards was evident. The latter was associated with a transfer of responsibility to government authorities. Further, nuances existed within the narrative of capability expressed for familiar hazards, masking a latent expected transfer of responsibility to government authorities when coping capacity was exceeded. While perceptions of capability instigate the implementation of coping strategies (Poussin et al. 2014; Unsworth et al. 2013), they are an argued disincentive to considering additional action (Shaw et al. 2014; Wolf et al. 2010). Therefore, the likelihood of adaptive action is limited (Grothmann and Reusswig 2006; Koerth et al. 2013; Lam 2014; Le Dang et al. 2013).

While the perception that further information will aid household response and an expressed willingness and perceived capability to act are positive attributes expressed within the communities – in the absence of a perceived need to access and apply information, research suggests it is unlikely be adopted (Neuwirth et al. 2000). Therefore, if the Australian government seeks to engage households in adapting to climate risks, it is worthwhile considering the factors influencing narratives of capability and how these may be constructively challenged to provide incentives for action at the household scale.

The perceptions of capability expressed within the coastal communities were influenced by past experience and the performance outcome of coping strategies, personal or vicarious experiences highlighting the supportive role of State Emergency Services, self-ascription of positive household attributes (a form of internal verbal persuasion), as well as normative perceptions of the role of ‘other’ agents in managing climate hazards (e.g. household versus government responsibility) (Fig. 1). Households assigned themselves capable and responsible for independent action until coping capacity was reached and then ‘someone else’ was expected to act. Consequently, households prepared for familiar hazards, while State Emergency Services and government post-impact support (e.g. financial subsidies) were expected to cater for shortfalls. The findings are consistent with the concept of reflexive responsibility defined by Bickerstaff et al. (2008), where responsibility to act is determined based on judgments regarding the likely outcome of personal action in relation to the actions of others.

Fig. 1 Elements reinforcing perceptions of capability



To address the ‘unrealistic expectations and unsustainable dependencies’ (Council of Australian Governments 2011; p. 2) placed on government hazard response agencies, the Australian government has invested strongly in making communities more self-reliant by emphasising individual responsibility (Allen 2013; Kent 2009) (see for example Commonwealth of Australia 2015; Council of Australian Governments 2011; DCCEE 2010). Promoting self-reliance can be viewed as a form of verbal persuasion (Bandura 1977). Households are led, through suggestion, to believe that they can cope successfully with hazards if they take adequate preparatory action such as securing loose items in the yard or clearing gutters. This narrative reinforces a perception that coping strategies are sufficient, further diminishing incentives for adaptive action. Furthermore, emphasising self-reliance and advocating coping strategies to the exclusion of actions that demonstrate more significant adaptation may perpetuate the cycle of perceived capability and coping.

This study therefore highlights the importance of distinguishing between adaptive capacities and perceptions of capability. In doing so we identified the forms of capacity sought by the coastal households (e.g. information), whilst uncovering perceptions of capability that are a disincentive to adaptive action. While socio-political influences on perceptions are often deeply embedded and difficult to change in the short-term, identifying perceived capability and capacity needs is pivotal in determining the likely utility of adaptive capacity stocks as measured through quantitative means. The results of this study suggest that in the absence of communicating limits to government support, expectations of support and in turn capability to respond will remain. Therefore, discussing actions households can take, actions expected of others, expected outcomes of action, and collective limits to capability, may facilitate households to re-evaluate assumptions that justify passing responsibility to others when action additional to coping is required.

Communicating a need for further action may contrast with households expectations regarding responsibility, risk, and capability: challenging communication efforts (Moser 2014). The prioritisation of external information (e.g. from government agencies) was, however, higher for households with past experience of a climate hazard. Therefore approaches to communicating climate adaptation information could be tailored based on experience (Moser 2014). In addition, providing information that allows households to assess their own abilities and foster the development of their own capabilities (Neuwirth et al. 2000) may raise awareness of adaptive measures, ease of implementation and circumstances in which external support may be required. Examining the extent to which such information leverages the dominant narrative of capability to deliver household action would be a worthwhile area of further research.

5. Conclusion

Perceived capability to act is an important determinant of local action; however, household perceptions of capability and capacity needs are rarely sought to inform adaptation interventions. In

this paper we demonstrate that households may perceive themselves capable of responding to climate risks despite measurable differences in capacity. This raises considerations for adaptation research relying on quantitative measures of capacity to identify vulnerable populations and provide incentives for action. While the social-political contexts shaping narratives can be difficult to change in the short-term, understanding their role in shaping adaptive choice is integral to developing strategies that facilitate household action. Within Australia, policies emphasising self-reliance support notions of capability that are a disincentive to additional action. Consequently, communicating actions households can take, actions expected of others, expected outcomes of action, and collective limits to capability may facilitate additional action at the household scale.

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