

# **Women and Environmental Justice: a literature review**

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*(Including two sections from Women's Health Goulburn North East)*

## **Abstract**

Environmental justice is realised by the fair and equitable distribution of environmental burdens across the entire population, as well as the ensuring of equitable access to and involvement in the mechanisms used to address environmental issues. Although in the past the environmental justice movement has focused mainly on race- and, to a lesser extent, class-based injustice, we at Women's Health in the North (WHIN) believe that a gendered analysis of environmental issues is central to achieving environmental justice. This will ensure that women and girls are not disproportionately affected by environmental problems such as those caused by climate change, and that any needs they have that are different to those of men will be adequately addressed.

In order to ascertain the effects that climate change and other environmental problems are having and will have on women and girls in Melbourne's northern region, WHIN is producing a wide-ranging literature review which addresses a number of topics that relate to women and environmental justice. These topics include the role of women's economic participation; women's specific vulnerability to natural disasters and heatwaves; the relationship of women's mental health to climate change; the specific situation of rural women; effects on the elderly, children and disabled; and women's leadership. Our research has shown that women are unduly affected by environmental problems for three main reasons: because they live longer, because they are generally poorer than men, and because of the social construction of womanhood. The interaction of these factors with forms of discrimination such as sexism, racism and ageism result in social conditions that put women at risk of environmental injustice. These findings have the potential to inspire policy that will work towards equalising the now unfair distribution of environmental burdens.

## **Introduction**

Climate change is real, caused by humans and poses a serious threat to humanity. According to Professor Ross Garnaut, those who have spent their professional lives researching climate change and its impact in all countries and in all disciplines are in agreement with this statement (Garnaut 2011). Climate change is clearly one of the most urgent issues of the twenty-first century. Sea levels are rising, concentration of carbon dioxide is increasing in the atmosphere, sea-ice is melting and extreme weather events including disasters are becoming more frequent (McMichael 2011). The implications for human health are significant, and health promotion theory is key to understanding the dynamics, with its explicit focus on the root causes of ill health and health inequalities (Richard G. Wilkinson 2003).

The ... erroneous, view is that 'health' is something personal, dependent on local and individual-level factors: pills, vaccinations, auspicious genes and access to health-care ... In fact, and more fundamentally, population health depends most of all on food supplies, freshwater flows, stability of infectious disease patterns, natural buffering against extreme weather events (by forests, wetlands, reefs, and so on), overall social stability and the avoidance of conflict over scarce natural resources.

Climate change has been recognised as a risk multiplier, so populations already disadvantaged will be worst affected. Women are disproportionately affected by environmental problems. There are three main reasons for this: the social construction of womanhood, women's longer life expectancy, and women's poverty. The interaction of these factors with forms of discrimination such as sexism, racism and ageism result in social conditions that put women at risk of environmental injustice. Despite the clear link between gender and experience of climate change, a gendered perspective is largely absent from environmental research, policy, planning and implementation.

In this literature review, Women's Health In the North has drawn together existing research that has considered environmental issues from a gendered perspective to advance environmental justice for women and men. Topics cover the role of women's economic participation; women's specific vulnerability to natural disasters and heatwaves; the relationship of women's mental health to climate change; the specific situation of rural women; effects on the elderly, children and disabled; and women's leadership. These findings have the potential to inspire policy that will work towards equalising the now unfair distribution of environmental burdens.

## **Definitions**

The United States Environmental Protection Agency defines environmental justice as:

“...the fair treatment and meaningful involvement of all people regardless of race, colour, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.” (EPA 2011)

This definition has been criticised by environmental justice advocates for its lack of emphasis on the historical burden of environmental hazards on marginalised groups and its lack of acknowledgement of social justice and political empowerment as central goals of the environmental justice movement (Wilson 2010). However, it captures two important central ideas of environmental justice: that is, the equal distribution of environmental burdens and benefits across all people, and the equal and fair involvement of all groups in environmental decision-making. Schroeder, St. Martin et al. have characterised these two aspects of environmental justice as distributive and procedural justice, which, along with race, they describe as the three main themes of environmental justice literature (Schroeder, St. Martin et al. 2008).

It is generally accepted that the roots of the contemporary environmental justice movement lie in the controversies over the contamination of Love Canal in New York state in the late 1970s and the African-American protests over the dumping of toxic waste in North Carolina in 1982 (Schroeder, St. Martin et al. 2008; Wilson 2010). Wilson argues that the principles of environmental justice have earlier roots in the attempts of Native Americans to gain land rights during the time of colonisation in America, and similar claims made by African Americans during the time of slavery. Perhaps as a result of these origins, the contemporary environmental justice movement is still most active in America: although an environmental justice framework is increasingly being used in the context of third world environmental movements (Schroeder, St. Martin et al. 2008), its application in the rest of the world is limited (Arcioni and Mitchell 2005). In Australia, the issues of inequality that are the focus of environmental justice have been addressed (for an example, see the Garnaut Climate Change Review (Garnaut 2011)), the environmental justice framework has rarely been used in this country, if at all.

Traditionally, racial discrimination has been the central issue around which environmental justice has organised (Schroeder, St. Martin et al. 2008). More recently, however, other forms of discrimination such as class-based and gender-based discrimination have started to receive attention. Buckingham and Kulcur, for example, call for the definition of environmental injustice to be broadened to include a greater focus on gender and class (Buckingham and Kulcur 2009). In many cases, the issues of gender, race and class (in combination with other issues such as age and disability) may intersect and interact with one another; according to disaster researcher Elaine Enarson:

“...exclusive categories of vulnerability — elderly or female, migrant or single mother — falsely de-gender intersecting identities and social relationships. Gendered vulnerability does not derive from a single factor, such as household headship or poverty, but reflects historically and culturally specific patterns of relations in social institutions, culture and personal lives. Intersecting with economic, racial and other inequalities, these relationships create hazardous

social conditions placing different groups of women differently at risk[.]” (Enarson 1998)

Thus, using an environmental justice framework that focuses solely on race, or indeed on any single issue, is inadequate to address the environmental injustices faced by much of the population.

## **Purpose**

As a result of increasing publicity surrounding climate change, Women’s Health In the North (WHIN) has recently become concerned about the effect of environmental problems and changes on women in Melbourne’s northern region. Following the work of academics such as UK-based geographer Susan Buckingham, WHIN has decided to use the environmental justice framework to explore this topic. This framework is a set of ideas and concepts that places the focus of all analyses on the distribution of environmental burdens. The use of this framework provides significant benefits: the existence of a body of research in the area allows access to concepts and ideas that can easily be applied to WHIN’s work, and provides a powerful framework on which to build future endeavours. In addition, women have traditionally made up the majority of leadership and participation in the environmental justice movement (Unger 2008), and thus joining the movement is to recognise the strength and resourcefulness of women who have achieved change within their communities, their potential for leadership in environmental justice worldwide, and to take advantage of these qualities to make change in Melbourne’s north.

The purpose of this literature review is to gather evidence about the exact nature and extent to which environmental justice issues affect women in Melbourne’s northern region, or may affect them in the future, especially as the effects of climate change become more apparent.

## **Parameters**

The research question guiding this document was: ‘Will climate change have a disproportionate effect on women and how will this affect women in the Northern Metropolitan Region?’

The literature search began with interrogation of online databases and other electronic searching using key words ‘climate change’, ‘environmental justice’, ‘women’, ‘gender’ and key words from each specific section. The databases used were those included in academic search engines. The period covered was 1980 to the present date with preference given to recent data. Key authors were quickly identified and the reference lists on their articles were scanned for new authors and references of interest to this topic, prompting a new search of electronic databases. Where possible, information has been used from Melbourne or elsewhere in Australia. If such information is not available, however, as much as possible information has been used from countries that can be considered similar to Australia

in the particular context. In most cases these “similar” countries are other developed countries, but occasionally examples from developing countries have been used when the circumstances they describe could be considered applicable to Melbourne. Due to time and resource constraints as well as the wide-ranging and complex nature of the topic, it is necessarily a broad overview rather than a detailed examination.

## **Economic Participation**

Women are generally poorer than men (Agyeman 2000; Christopher, England et al. 2002; London Sustainability Exchange 2004; Buckingham, Reeves et al. 2005; Hansson 2007; Aguilar 2009). In Australia, women earn 18% less than men on average (Australian Services Union n.d.). In addition, disabled women are poorer than disabled men (Enarson 1998; WWDA 2008), and elderly women are much poorer than elderly men (WHE 2010); according to some figures over half of all single elderly women live below the poverty line in Australia (Cooke 2008). Feminist analyses give two main reasons for this (Pressman 2003): firstly, the far greater likelihood that the burden of caring for children and sick or elderly family members will fall on women, and secondly the segregation of women into low-paying work (Winchester 1990). These factors are inter-related and are influenced further by other factors, such as the fact that women are much more likely to be single parents (Christopher, England et al. 2002) and tend to live longer.

Higher poverty rates among women mean that in general, women have less access to the resources that would enhance their ability to adapt to climate change (Aguilar 2009). This means that women will be less able to afford to make expensive adaptation measures to cope with climate change, such as retrofitting homes to reduce the impact of heatwaves (Skutsch 2002; Hansson 2007). In addition, urban planning is a gendered process (Enarson 1998), with women-headed households more likely to exist in areas suffering from higher traffic and industrial pollution (Buckingham, Reeves et al. 2005). Poorer areas are also more likely to be polluted: one UK study found that 662 polluting factories existed in areas with an average household income of below 15 000 pounds, while only five existed in areas with an average income of above 30 000 pounds (Agyeman 2000)(see also “Housing” and “Transport” sections). Food security is also an issue for women as poorer households are less able to afford healthy food options (Edwards, Dixon et al. 2011). (See “Food security” section for more information.)

## **Housing**

Accompanying higher poverty levels among women is the difficulty in finding safe, affordable housing. In urban settings, both working class and middle-to-upper class suburbs contain women who may have different housing needs to men. These women may live in public housing, rented accommodation or be homeless; they may be in prostitution; they may be migrant or refugee women working in underground

sweatshops or performing home or domestic work (Enarson 1998). Women living in rural areas have different needs again. Many poorer women are exposed to higher rates of pollution and traffic noise as they cannot afford to buy their way out of degraded areas (Buckingham, Reeves et al. 2005). In addition, women are more likely to experience fuel poverty by living in draughty, poorly-insulated or damp housing (Buckingham, Reeves et al. 2005), leaving them vulnerable to health problems in winter. In summer, the location and quality of housing is crucial to providing protection against heatwaves; for example, the presence of air conditioning and/or insulation, which is expensive to install and run, can protect against heatwaves (Rogot, Sorlie et al. 1992; Semenza, Rubin et al. 1996; Vandentorren, Bretin et al. 2006; Bouchama, Dehbi et al. 2007), while living on the top floor of a building can increase risk (Semenza, Rubin et al. 1996; Vandentorren, Bretin et al. 2006). Researchers have also found that newer dwellings, dwellings with a higher number of rooms and dwellings with a higher 'comfort level' tended to be safer during heatwaves, as was living in a house rather than an apartment; this is probably because newer, larger, more comfortable houses tend to be more expensive and presumably their occupants are better able to afford high quality of housing (Semenza, Rubin et al. 1996; Vandentorren, Bretin et al. 2006). As a result, many poorer women find this type of housing inaccessible.

Women-headed houses are significantly more likely to be on a lower income (Buckingham, Reeves et al. 2005) and lone female parents are much more likely to live in rented accommodation or public housing (Winchester 1990); in Australia, 50% of low-income households are renters (VCOSS, Toohey et al. 2009). They are also more likely to lack basic amenities, suffer from overcrowding and spend a disproportionate amount of income on housing (Winchester 1990). There are currently no minimum standards for rental properties in Victoria, leaving many women renters vulnerable to high electricity bills due to poor or non-existent insulation and health problems resulting from severe damp and/or mould (VCOSS, Toohey et al. 2009); these problems are likely to increase with the temperature fluctuations resulting from climate change.

Homeless people are particularly susceptible to the effects of climate change due to their lack of shelter from extreme temperature and weather events (such as severe storms), as well as the higher rates of chronic disease, smoking and respiratory illness from which they suffer (Ramin and Svoboda 2009). In addition, due to their lower general level of health and large amount of time spent outdoors, their vulnerability to mosquito-borne diseases such as malaria is heightened; this is likely to become a severe problem as the range of such diseases increases with climate change (Ramin and Svoboda 2009). Perhaps due to their transience and thus their 'invisibility', their needs are often ignored: for example, the homeless make up a significant proportion of victims in heatwaves, but are rarely taken into account (Ebi and Meehl 2007). Homeless women (often accompanied by their children) make up a significant portion of the homeless population in Australia (Homelessness Australia n.d.) and often experience mental illness, are fleeing domestic violence or suffering from severe poverty (Bachrach 1987; Trickett 2007; Finfgeld-Connett 2010; Homelessness Australia n.d.). The main factors leading to homelessness (such as

poverty, unemployment and domestic violence) are over-represented in women with disabilities (WWDA 2008), and elderly women and rural women are also vulnerable (Trickett 2007). All of these groups of homeless or potentially-homeless women have unique needs which are currently not adequately met by service providers (Bachrach 1987; Trickett 2007); these needs are even less likely to be met as the effects of climate change worsen.

## **Transport**

Women have considerably different transportation needs to men. It is known that men tend to use cars more than women: internationally (Hamilton and Jenkins 2000; Skutsch 2002; Dobbs 2007; Hansson 2007; Johnsson-Latham 2007), and within Australia (Lyth-Gollner and Dowling 2002). If a household possesses only one car, it is “overwhelmingly” likely that it will be used by the adult male (Hamilton and Jenkins 2000), and women-headed households are significantly less likely to own a car (Winchester 1990). Unsurprisingly, this means that women are more likely to use public transport than men (Hamilton and Jenkins 2000; Johnsson-Latham 2007). Perhaps as a result, it has also been found that women on average have a more positive attitude towards public transport and towards the idea of taking long journeys on public transport (Randi 2001); this is an illustration of the extent to which socialised gender roles can play a part in women’s experience of environmental justice. Mobility is imperative for women to be able to live independent and fulfilling lives (Johnsson-Latham 2007) and to be able to access employment, which is absolutely crucial for single women (Dobbs 2007). For this reason, it is imperative that public transport be reliable, climate-proof and sensitive to women’s needs. This is an issue in Melbourne, where many trains are placed out of commission on days when temperatures exceed 35 degrees C (Morton 2009), despite the fact that the frequency of such days is quite high in summer, and will likely increase with climate change (CSIRO 2009). Safety must also be taken into account, as women commonly restrict travel to avoid placing themselves in situations which they consider to be dangerous (Hamilton and Jenkins 2000).

Women’s difficulties with transport are often exacerbated by urban planning; furthermore, urban planning is linked to problems with sustainable transport usage. Johnsson-Latham has suggested that the high volume of car usage in Sweden and the USA is linked to the design of cities which have workplaces in the centre and are surrounded by suburbia (Johnsson-Latham 2007). Since Melbourne is built along the same format, it seems likely that similar issues apply. The separation of home from work and from other facilities combined with inadequate transport services contributes to the isolation of many women living in the suburbs (Winchester 1990). Women may also be shut out of more accessible areas due to the process of gentrification (Winchester 1990), as is currently occurring in Melbourne suburbs such as Fitzroy and Northcote (Overell 2009). Women in rural areas are even more likely to be isolated due to the lack of public transport (Johnsson-Latham 2007), and the feasibility of long journeys by car may be limited by the high cost of petrol and vehicle maintenance (Stehlik, Lawrence et al. 2000).

## **Food Insecurity**

Hunger is a growing problem in developed countries such as Australia, though on a much smaller scale than in developing countries (Riches 1997). Climate change will result in an increase in average food prices and in the frequency and severity of price spikes (Quiggin 2007), meaning that the problem of hunger will increase. Although Australia as a nation produces enough food to feed its population, some individuals and households within it suffer from food insecurity (Tipper 2010). In its most basic sense, food insecurity is defined as the inability to afford adequate or appropriate food, but many definitions also include the anxiety generated by the inability to acquire food in a socially acceptable way (Booth and Smith 2001). Women have traditionally managed household budgets and food supplies (Lo, Yu-Hung et al. 2009; Phillips 2009), and hence are often aware of food insecurity earlier than other members of the household, which is likely to lead to anxiety and stress. Generally women will be the first to reduce their own food intake for the sake of children or partners even though the family relies, to an extent, on their well-being due to their control of food supplies (Phillips 2009). Furthermore, women are more likely to sacrifice their dietary requirements or preferences to those of their partner (Tipper 2010).

The risk of food insecurity is most strongly connected to poverty (Riches 1997; Booth and Smith 2001; Buckingham, Reeves et al. 2005; Lo, Yu-Hung et al. 2009; Tipper 2010), as healthy diets are more expensive (Lo, Yu-Hung et al. 2009) and food is considered a flexible part of the budget as opposed to expenses such as rent and mortgage repayments (Riches 1997; Tipper 2010). As a result, poorer women and single mothers generally experience an elevated risk of food insecurity (Tipper 2010). For example, in Victoria in 2008, 6.5% of women (and 4.5% of men) ran out of food in the previous year and could not afford to buy more (Department of Health 2008), while in Canada in 2000-2001, one third of single mothers experienced food insecurity (Rideout, Riches et al. 2007). Another factor contributing to food insecurity is physical access to food (Booth and Smith 2001): if shops do not stock an adequate variety of food, or if such shops are not accessible due to a lack of transport (Tipper 2010), the likelihood of food insecurity is increased. This means that rural women may be more vulnerable to food insecurity. Housing may also be an issue, as having access to a kitchen and to food storage areas is vital (Tipper 2010); homeless women are thus at risk. An (accurate) perception of the high cost of healthy food may prevent some women from attempting a healthier diet, while a fear of wasting food that children do not like may lead to a reduction in the variety of food purchased (Tipper 2010). A lack of culturally-appropriate food may also lead to a reduction in variety (Booth and Smith 2001; Tipper 2010). Food insecurity may contribute significantly to social isolation or exclusion and be a cause of substantial anxiety to many women.

## **Mental Health**



Gender differences in mental health have been well-documented: generally, men suffer from higher rates of “externalising” disorders, such as aggression, while women are more vulnerable to “internalising” disorders, such as depression, anxiety and psychological distress (Needham and Hill 2010). The connection between gender inequality and adverse mental health outcomes for women is acknowledged to be significant (Wiest, Mocellin et al. 1994; Tansella 1998), but a lot of research still fails to make the link between socialised roles and women’s mental health.

The relationship between climate change and mental health is also fairly well-documented. Berry suggests that three aspects need to be considered in the causal relationship between climate change and mental health problems: the increase in post-traumatic stress disorder (PTSD) and other long-term mental health problems due to the increase in frequency and severity of natural disasters; the increased risk of physical health problems; and the changing states of natural and social environments (Berry, Bowen et al. 2009). It is also suggested that certain adaptation and mitigation strategies may have adverse mental health outcomes (Berry, Bowen et al. 2009). Another possible factor to consider is the increase in aggression noted during periods of high temperature (Cheatwood 1995), which could conceivably be linked to increases in levels of violence against women. In Australia, Fritze, Blashki et al. have recognised the effects of climate change on mental health, especially on communities which are economically and socially vulnerable or living in disaster-prone areas (Fritze, Blashki et al. 2008).

The effect of climate change on women’s mental health is generally not well-documented, though some work has been conducted in the area of drought. For example, A Brazilian study found that people in drought-inflicted areas suffered from greater levels of anxiety, with women worse afflicted than men (Coêlho, Adair et al. 2004). The findings of Shore, Tatum and Vollmer in a study of the 1980 eruption of Mount St. Helens support Coelho’s claims, but Coelho also states that the research is inconclusive on this point (Coêlho, Adair et al. 2004). In Australia, significant research has been conducted on the effect of drought in rural areas by researchers such as Margaret Alston and Daniela Stehlik, who have used interviews with both men and women to examine the gendered experience of drought (Stehlik, Lawrence et al. 2000; Alston 2006) (see “Impact on rural areas”). However, more research is required on the effect of climate change on women’s mental health, especially in metropolitan areas.

## **Impact on rural areas**

The agricultural sector in Australia is highly male-dominated and patriarchal (Alston 2007). As a result the work women do is often invisible and their labour may be taken for granted (Alston 2007), although this is not always the case. The specific needs of women are often not considered in agricultural policy and rural community leadership (Alston 2007) and issues of most concern to women are frequently overlooked in the face of wider community issues (Milne 2005). In addition, women are greatly under-represented in agricultural and natural resource decision-making

(Stehlik, Lawrence et al. 2000; Milne 2005). All these characteristics of rural life mean that women's needs are likely to be overlooked in responding to the challenge of climate change in rural areas, even though women's specific knowledge is a valuable source of information that could potentially be used to face these challenges.

The effect of climate change on rural women has not been well-researched. However, some important work has been done on drought, the incidence of which is expected to increase across south-eastern Australia with climate change (CSIRO 2009). Since drought is a climate-influenced condition that Australia is already familiar with, it can be used as a case study to deepen understanding of the effect climate change is likely to have on women living in rural areas (Alston 2007).

Margaret Alston has found that women were often forced to seek off-farm work to supplement family income, a phenomenon which has been linked to systems of patrilineal farm inheritance and differential task allocation on farms (Anderson, Ward et al. 1995)(Alston in Anderson 2009). A long history of a farm being passed down through the male line can create a great unwillingness to give up the farm in difficult financial circumstances. Alston found that traditionally task allocation on the farm is such that the male partner will primarily do the farm work and the female will have full responsibility for the housework. However, other research has found that women will often also work on the farm, especially during difficult times (Halliday 2000; WHGNE 2010). In times of hardship, women, whose work in the house is seen as less important to the survival of the farm, are the ones who will look for work outside the farm to supplement the family income. Although Stehlik found that off-farm work was a positive experience for some women due to the change in environment and increased economic freedom (Stehlik, Lawrence et al. 2000), balancing it with gender role obligations such as housework, the need to support the family emotionally and to do extra work on the farm (especially if employing farm hands became unaffordable) was stressful for most women (Stehlik, Lawrence et al. 2000; Alston 2007). Stehlik found that the role changes forced upon women as a result of drought often led to feelings of insecurity and instability within the family due to the change of routines. This stress often placed considerable strain on personal relationships, even leading some women to consider leaving their husbands (Stehlik, Lawrence et al. 2000; Alston 2006). For women living on farms, separation or divorce is frequently financially complex and often raises difficult questions of succession and inheritance as divorce settlements can lead to the loss of all or part of a farm that has been held in the family for generations (Barclay, Foskey et al. 2007; WHGNE 2008). Furthermore, the isolation of rural areas makes the issue of what to do with children more complicated (WHGNE 2008). These issues create serious obstacles for rural women who want to leave their partners, and the fact that they would consider such an option may be an indication of the severe stress placed on them by the drought.

Additionally, Stehlik's research found that in many cases women became the de facto financial managers of the farm because they were more likely to be indoors and able to answer the telephone. This role was usually a difficult one because of the direct exposure to the effect of the drought on the farm's financial situation. Despite

this role, she found that women were often partially or fully excluded from farm decision-making. This sometimes means that financial and natural resources were directed away from areas that were prioritised by women (such as private gardens, which were important to many women participating in the study). Furthermore, she found that women were more likely to worry about the emotional effect of the drought on their children, which was a significant cause of distress. However, she found that couples who shared burdens of decision making found their relationships strengthened and the challenges of drought easier to bear (Stehlik, Lawrence et al. 2000).

## **Gender and disaster**

*(Abridged from WHGNE Women, Disaster and Violence Literature Review)*

World-wide evidence suggests women and children are at greater risk than men both during the disaster and in its aftermath (Domeisen 1998; Alston 2009; Phillips, Jenkins et al. 2009; Dasgupta, Siriner et al. 2010). Indeed, the common factor in recent tsunamis, earthquakes, and hurricanes is that the majority of victims were women, children and other vulnerable groups (Phillips, Thomas et al. 2009).

In developing countries, disasters bring higher mortality rates for women than men (Domeisen 1998; Neumayera and Plümperb 2007), mostly as a result of socially determined gender roles and subsequent exposure to risk. As women are poorer than men in all countries, they are more likely to live in poorly constructed housing and risk-prone areas (Scanlon 1998; Dasgupta, Siriner et al. 2010; Neumayera and Plümperb January, 2007). Another factor is women's responsibility for children, restriction in the home, and lack of transport which may hamper their escape (Rivers 1982; Molin Valdés 2009; Henrici, Helmuth et al. 2010). Even in the Australian context, women are often left with the responsibility to protect the home and dependents as men join community efforts to fight fires (Gilbert (2004) cited in DeLaine, Probert et al. 1-3 September, 2003; Valent 1984; Honeycombe 1994; Proudley 2008; Raphael, Taylor et al. 2008).

Of the 300,000 deaths caused by the 2004 Indian Ocean Tsunami in 13 nations, 80 per cent were women and children (Phillips and Morrow 2008). The gendered pattern so unmistakable in developing countries, is evident in more ambiguous ways in the developed world. In the US, it appears more men than women are killed in disasters caused by severe weather events such as lightning, thunderstorms, flash floods and hurricanes (Fothergill 1998). In Australian bushfires, this is historically true, although before the 2009 Black Saturday bushfires, the gap in the mortality rate was closing with female mortality rates higher in the Lara fire of 1969 and the Eyre Peninsula fire of 2005 (Haynes, Tibbits et al. 2008). Black Saturday killed 100 males and 73 females (Victorian Bushfires Royal Commission 2009). Again, socially constructed gender roles play a part with researchers suggesting men take greater risks than women and are more likely to be involved in outdoor activities (Haynes, Tibbits et al. 2008; Neumayera and Plümperb January, 2007).

Where discrimination against women is more blatant, the link between gender and disaster impact is transparent with women clearly at greater risk of death in a disaster. The subtler forms of sex-discrimination in the developed world, however, mean that women have increased risk of economic insecurity; increased workload; fewer supports for workforce participation and increased conflict in the home, the community and the workplace (Phillips and Morrow 2008; Enarson September 2000).

Economic recovery initiatives after a disaster are predominantly directed to projects involving male labour (Enarson 2006) and men are favoured by recovery efforts and funding allocation (Scanlon 1998; Molin Valdés 2009; Dasgupta, Siriner et al. 2010). Further inequities to financial recovery emerge because of women's greater role in caring for dependents (Enarson and Phillips 2008).

## **Disaster and violence against women**

*(Abridged from WHGNE Women, Disaster and Violence Literature Review)*

In developing countries, women's experiences following disasters indicate that physical and sexual violence increases (Palinkas, Downs et al. 1993; Wilson, Phillips et al. 1998; Enarson 2000; Molin Valdés 2009; Dasgupta, Siriner et al. 2010) and it seems there is a growing body of evidence to support this (Phillips and Morrow 2008).

The evidence in developed countries is only just emerging. A review of 100 studies that considered gender in relation to disaster was conducted in 1998 (Fothergill 1998). While several of these studies referred to an increase in divorce rates and child abuse (see also Dasgupta, Siriner et al. 2010), very few identified increased violence against women.

Indicators of increased physical and sexual violence against women have been noted after disasters in the US including Hurricane Andrew in 1992 (Fothergill 1998; Wilson, Phillips et al. 1998) and the 1997 Dale County earthquake and confirmed by a new study of 77 Canadian and U.S. domestic violence programs (Enarson July 1999). A decade later, increases in violence against women were reported after Hurricane Katrina in 2005 (Austin 2008; Anastario, Shehab et al. March, 2009); after the 2010 Louisiana oil spill (US Gender and Disaster Resilience Alliance 2010); and after the 2010 Haiti earthquake (Bookey 2010).

Closer to home, the New Zealand police reported a 53 per cent increase in reports of domestic violence after the Canterbury earthquake on 4.9.2010 (Houghton 2010), and domestic violence service reports showed a 50 per cent increase in demand after the earthquake six months later on 2.3.2011 (Phillips 2011). In Australia, there is no published research to date which looks specifically at violence against women after disasters.

Violence from intimate partners and sexual violence is grossly under-reported at any time and this seems to be exacerbated at times of disaster (Phillips, Jenkins et al. 2010). Whether disaster recovery is set up to recognise and address violence against women seems to depend on how well it was done before the disaster (Fothergill 2008). If violence against women was recognised as a problem before the disaster, it

was more likely to be part of the recovery strategy (Wilson, Phillips et al. 1998). Australian research over the past decade shows very low rates of women reporting sexual violence or physical violence to police (Mouzos and Makkai 2004), low conviction rates and high rates of case withdrawal (Lievore 2005; Australian Institute of Criminology 2007; Australian Bureau of Statistics 2010).

This may reflect prevailing community attitudes of blaming women for such violence. It would seem that '[m]ost societies tend to blame the victim in cases of sexual violence' (Inter-agency standing committee, September, 2005, p. 4). In physical violence, too, there is evidence that a significant proportion of Australians blamed women and excused men for violence between partners (Atkinson 2002; VicHealth 2009). As violent men ordinarily use situational factors to excuse their violence, their experience of disaster may be perceived by themselves and others as reason enough for 'losing control' (Fothergill 2008).

A prevailing 'private domain' of domestic violence and sexual violence (Inter-agency standing committee September, 2005) is compounded by empathy for the abuser and excuses of 'out of character' behaviour. This may result in under-recognition of violence against women, lack of validation by service providers and an ever lower rate of reporting by women.

Explanations for increased violence against women are varied:

Natural disasters do not exist in isolation from the social and cultural constructs that marginalize women and place them at risk of violence. In fact, there is evidence that violence against women increases in the wake of colossal disasters and that the increased risk is associated with gender inequality and the limited representation of women in disaster responses. (Rees, Pittaway et al. 2005)

The UN Inter-Agency Standing Committee noted that 'the most immediate and dangerous type of gender-based violence occurs in acute emergencies' perhaps because personal resilience is decreased and community protections are compromised (Inter-agency standing committee September, 2005). Disaster researchers agree that the usual constraints to behaviour offered by legal and societal expectations disperse in the chaos of disaster recovery (Austin 2008; Enarson and Phillips 2008; Bradshaw, 2004, cited in Neumayera and Plümperb January, 2007). After floods in Queensland, Dobson wrote, 'It was as if the balancing influences were removed and life became very raw and stark' (Dobson 1994).

Life changes brought about by the disaster can present threats to the male provider and protector role, along with loss of personal control, and relationship pressure - including increased and possibly forced contact between the couple; (Phillips, Thomas et al. 2009). Relocation can be stressful, causing changes to social and support networks and living conditions (Phillips and Morrow 2008; Uscher-Pines 2009).

Hand in hand with heightened stress is drug and alcohol abuse, and this appears to play out in gendered ways. Some men become unemployed, silent, suicidal, feeling 'unmasked and unmanly' and, turning to drugs and alcohol, endanger others (Enarson 2006, para. 4). Enarson and Phillips (2008) wrote that from Peru to Alaska,

men cope through alcohol abuse and aggression, and Austin (2008) observed a form of hyper-masculinity that emerges from the stress and loss.

An exacerbating factor is that disaster often increases isolation for women and with isolation comes increased vulnerability, especially as emergency and support services are stretched (Enarson, n.d., cited in Renzetti Fall, 2002). Apparently, “domestics” become a much lower priority’ (Renzetti Fall, 2002).

In contrast, disasters can offer women new options in leaving a violent partner. Women were afforded these opportunities though a newfound confidence in their own ability brought about by the way they coped with the disaster (Fothergill 2008) or new roles in recovery efforts within the community; or by using grants or insurance payouts to leave (Fothergill 1998; Fothergill 2008; Jenkins and Phillips Fall, 2008).

## **Heatwaves**

Heatwaves have a disproportionately large effect on metropolitan areas due to a phenomenon known as the urban heat island effect. Urban heat islands are created because the materials from which cities are built have a tendency to trap heat, meaning that the average temperature of urban areas is significantly higher than that of rural areas (Vaneckova, Hart et al. 2008). The urban heat island effect, compounded with higher levels of air pollution in cities (Vaneckova, Hart et al. 2008), makes heatwaves especially deadly in cities. The effect of serious heatwaves has already been felt all over the world – for example, an extra 361 deaths occurred in Victoria in the 2009 heatwave (Department of Human Services 2009), and an extra 15 000 deaths occurred in France during the 2003 heatwave (Hansson 2007) – and the frequency and severity of heatwaves are expected to increase with climate change (Yaron and Niermeyer 2004; CSIRO 2009). Studies of heatwave mortality rates have shown that they may have a differential impact on women and men (Duncan 2007; Hansson 2007), as well as on people of lower socio-economic status, the elderly, and young children.

Almost all studies have found age to be the greatest factor in increasing vulnerability to heatwaves, with the elderly (Semenza, Rubin et al. 1996; Guest, Willson et al. 1999; O'Neill, Zanobetti et al. 2003; Fouillet, Rey et al. 2006; de'Donato and al. 2007; Ebi and Meehl 2007; Vaneckova, Hart et al. 2008; Trigo, Ramos et al. 2009; Yu, Vaneckova et al. 2010) as well as children and infants suffering disproportionately (Yaron and Niermeyer 2004; Ebi and Meehl 2007). (See ‘Elderly’ and ‘Children sections.) Given that women make up a greater proportion of the elderly (Trigo, Ramos et al. 2009), it follows that heatwaves will have a greater overall impact on women than on men.

Many studies have found that women are more likely to die in heatwaves across all age groups (Fouillet, Rey et al. 2006; de'Donato and al. 2007; Yu, Vaneckova et al. 2010); however, the results are conflicting; many other studies have found no difference in mortality between women and men (O'Neill, Zanobetti et al. 2003;

Huang, Kan et al. 2010). In a review of studies of heat-induced mortality, Basu concludes that variations in results could be due to the confounding effects of air pollution, but although the review identifies women as a vulnerable subgroup, the reasons for conflicting results in studies of women's mortality in heatwaves are not addressed (Basu 2009). The physical differences between men and women (see "Physical vulnerability to temperature changes" section) is acknowledged to play a significant role in the increased vulnerability of the elderly (see "Elderly" section), but whether it affects women's mortality due to heat waves in other age groups is not addressed in the literature. Research on other possible reasons for women's greater mortality rates is rare, but usually associates it with the vulnerability of living alone (Charatan 1995; Fouillet, Rey et al. 2006).

Socio-economic status (SES) and level of education are also factors that are sometimes found to increase vulnerability to heatwaves (O'Neill, Zanobetti et al. 2003; Ebi and Meehl 2007; Vaneckova, Hart et al. 2008), though some studies conclude that they have no effect (Guest, Willson et al. 1999; Yu, Vaneckova et al. 2010). Quality of housing, which is related to SES (Milne 2005), is also important (see "Housing" section). Given that women tend to occupy a position of lower socio-economic status than men (London Sustainability Exchange 2004; Buckingham and Kulcur 2009)(see also "Economic Participation" section), it is likely that this may increase women's vulnerability to heatwaves (Buckingham and Kulcur 2009).

The issue of mobility and access to transport is an important one in the study of heatwave mortality, as access to air-conditioning and the ability to visit cool areas is associated with higher survival rates during heatwaves (Rogot, Sorlie et al. 1992; Semenza, Rubin et al. 1996; Vandentorren, Bretin et al. 2006; Bouchama, Dehbi et al. 2007). (See "Transport" section.) This issue is linked to the influence of culturally determined gender roles, but is not well represented in the literature. For example, it is known that even in developed countries, women use cars less than men (Skutsch 2002; Johnsson-Latham 2007) potentially making it more difficult for them to travel to air-conditioned public places (Hansson 2007). As another example, it is generally accepted that children, along with the elderly, are especially vulnerable to heatwaves (Murkin 2002), but whether women's socialised roles as carers for children and elderly relatives may impair their ability to leave the home and travel to an air-conditioned environment during heatwaves is a question that has not been addressed. Generally there is a dearth of information about the effect of socially-determined gender roles on women's vulnerability to heatwaves.

### **Physical vulnerability to temperature changes**

The physical differences between men's and women's bodies may make women more vulnerable to the temperature changes related to climate change (Duncan 2007; Hansson 2007). There are two aspects to this issue: the anthropometric aspect, which relates to the size, shape and composition of women's bodies, and the physiological aspect, relating to biological processes and functioning. Although these differences seem to be irrelevant in adjustment to cold temperatures (Haciuba-Uscilko and Grucza 2001), in hot conditions the effect may be significant. This is a

significant concern due to the increasing rates of heatwaves expected to occur as a result of climate change (see also “Heatwaves” section).

A significant body of research exists relating to anthropometric influences on women’s vulnerability to heat. When women and men are matched for physical characteristics such as size, weight and physical fitness, differences are generally found to be negligible (Sawka, Toner et al. 1983; Kenney 1985; Cheung, McLellan et al. 2000; Hacıuba-Uscilko and Gruzca 2001), but this type of study gives no indication of the variations across women as a population (Hacıuba-Uscilko and Gruzca 2001). Women tend to have lower levels of aerobic fitness than men (Shapiro, Pandolf et al. 1980; Cheung, McLellan et al. 2000), have a higher proportion of body fat than men (Shapiro, Pandolf et al. 1980; Cheung, McLellan et al. 2000) and sweat less than men (Kenney 1985; Anderson, Ward et al. 1995; Hacıuba-Uscilko and Gruzca 2001; Mehnert, Brode et al. 2002). All of these characteristics tend to have a negative effect on the body’s ability to cope with to high temperatures.

On the other hand, some researchers have found that women’s higher ratio of surface area to mass (Cheung, McLellan et al. 2000; Vihma 2009) may be advantageous under certain circumstances (a larger surface area-to-mass ratio means that larger amounts of body mass are in contact with the outside air, better allowing heat to be released and regulated in hot temperatures. On average, women have a larger surface-area-to-mass ratio than men because they are smaller). In addition, some researchers have found that women’s lower levels of dripping sweat may be advantageous under certain conditions (Hacıuba-Uscilko and Gruzca 2001). Dripping sweat does not contribute to regulating body heat as it is the process of evaporation that provides cooling (Cook, Manson et al. 2009).

In addition, the degree to which the body is acclimatised to hot temperatures affects its ability to regulate heat (Sawka, Toner et al. 1983; Kenney 1985; Cheung, McLellan et al. 2000). This means that people living in warmer parts of the world are less likely to suffer mortality from heatwaves. Since Melbourne is located in a temperate climate zone, it is likely to suffer higher mortality rates across the whole population than cities such as Brisbane, which have consistently warmer climates.

Very little research exists regarding physiological differences between men and women (Hacıuba-Uscilko and Gruzca 2001). However, it is known that as core temperature varies during the menstrual cycle, women may be less able to regulate their body temperature at certain stages of their cycle (Hacıuba-Uscilko and Gruzca 2001). This variation in temperature regulation is also affected by oral contraceptive use (Cheung, McLellan et al. 2000; Hacıuba-Uscilko and Gruzca 2001), menopause, and the use of hormonal treatments (Hacıuba-Uscilko and Gruzca 2001). In addition, pregnancy diminishes the body’s ability to regulate heat, and exposure to high temperatures can have a negative effect on the developing foetus (Cheung, McLellan et al. 2000). However, the research is inconclusive and many issues remain unresolved (Anderson, Ward et al. 1995; Hacıuba-Uscilko and Gruzca 2001; Mehnert, Brode et al. 2002).



## Vulnerable populations

### Children

Children are considerably more vulnerable to the effects of climate change than adults, and are less capable of protecting themselves against such effects. According to US children's health experts Sheffield and Landrigan, 88% of the burden of disease caused by climate change falls on children, compared to 5-31% of the overall burden of disease, showing that climate change already has a disproportionately large impact on children's health (Sheffield and Landrigan 2011). This impact will increase as the effects of climate change worsens, and because children have more future years of life, the effects will have to be dealt with for many years to come even if climate change is halted (Sheffield and Landrigan 2011). The environmental justice considerations to be made for children are thus significant.

Exposure to malnutrition and certain diseases, toxins, chemicals and fungi *in utero* or during childhood often leads to more severe health problems than exposure during adulthood, partly because children's smaller size means that they experience a higher exposure per unit bodyweight (Sheffield and Landrigan 2011). Children are more likely to suffer from diarrhoea, dehydration and renal problems than adults because of the relatively higher volume of fluid in their bodies, and incidence is expected to increase with continuing climate change (Ebi and Meehl 2007; Sheffield and Landrigan 2011). For the same reason, heat stress is a significant problem for children (Murkin 2002; Yaron and Niermeyer 2004; Ebi and Meehl 2007; Sheffield and Landrigan 2011). They are similarly more vulnerable to air pollution, as well as the increase in pollen production and particulate matter that will result from climate change (UNICEF 2007; Perera and Sandford 2011; Sheffield and Landrigan 2011). Worldwide incidence of asthma, for example, is expected to increase by 20% by 2016 (UNICEF 2007). Children's patterns of behaviour, such as spending a greater proportion of time outside than adults, may also lead to greater exposure to insect vectors and chemicals such as pesticides (Sheffield and Landrigan 2011).

Children are more vulnerable than adults to death, injury and trauma resulting from natural disasters due to their small size, lesser strength, lack of experience and reduced ability to care for themselves (Murkin 2002; UNICEF 2007). For example, children are typically over-represented in flood death statistics, and number highly in fatalities due to bushfires (Haynes, Tibbits et al. 2008). Because children usually rely on adults to provide food, shelter and other necessities, they are more vulnerable to the effects of the poverty and social exclusion that can result from environmental injustices because of their inability to change any of these factors (London Sustainability Exchange 2004; Sheffield and Landrigan 2011). According to research performed by UK researchers Thomas and Thompson, children develop a relationship with their environment by interacting with it; "environmental awareness [during childhood]...is instilled through exploration of the natural environment." According to interviews conducted with a range of British children, Thomas and

Thompson found that they wanted “less traffic, better public transport, more green space, trees, dens, hiding places and less litter.” (Thomas and Thompson 2004).

Despite the fact that they arguably have the highest stake in issues of environmental justice, children have no say in this area; some sources suggest that children need to be included in decision-making processes (Thomas and Thompson 2004; UNICEF 2007). However, whether this is at all practical due to children’s reduced understanding of the complexity of governmental processes is not addressed.

Due to women’s traditional roles in raising children and as carers, anything that affects children will have a disproportionate effect on women (Popovic 2001).

## **Disabled Women**

Disabled people make up approximately 10% of any given population, but are often ignored (Declaration 2007). In the northern region of Melbourne, the percentage of disabled people is as high as 28.3% (in the City of Darebin, which has a relatively elderly population) (WHIN 2011). Women with disabilities are comparatively more economically and socially marginalised than men, and women’s greater life expectancy exposes them more to the physical disabilities of advanced age (Enarson 1998). In Australia, women with disabilities are significantly more disadvantaged than disabled men: they experience more sexual violence, domestic violence and violence from carers or in institutions, they receive less economic and social support as they are less likely to be employed, and if they are employed, they are more likely to be paid a lower wage than their male counterparts (Frohmader and WWDA 2001).

Literature on disabled people and climate change or environmental justice is virtually non-existent. Only a very small number of papers exist, mostly in the area of disasters. Disabled people have different needs in disasters from non-disabled people, as was explored in the 2007 international conference “Disasters are always inclusive: Persons with disabilities in humanitarian emergency situations” which took place in Bonn, Germany. The Bonn Declaration that arose from the conference outlines the current situation and suggests a number of measures that should be taken to improve the experiences of disabled people in disasters. Currently, the considerations of disabled people are rarely (if at all) included in disaster response and preparedness, and aid does not meet even their basic, let alone specific, needs. For the vulnerability of disabled people in disasters to be reduced, both of these factors must be rectified. In addition, people with “invisible” disabilities such as intellectual or psychological disabilities must not be forgotten. Attention must be paid to people who are newly injured or disabled as a result of the disaster; this includes the provision of adequate transport to prevent the aggravation of existing disabilities or new injuries of disaster victims, and monitoring for PTSD and trauma symptoms in the entire population to help avoid the development of long-term psychological disabilities. How such monitoring could be achieved is an obvious question, but possible solutions were unfortunately not addressed. The declaration suggests that disability organisations should build alliances with other groups, as, for

example, elderly people and pregnant women could also benefit greatly from many measures that benefit disabled women and vice versa. Finally, the long term effects of disasters need to be considered: continuing, affordable, accessible long-term medical care must be provided to disaster victims, and principles of accessibility must be built into the reconstruction of housing and infrastructure (Declaration 2007).

One of the few other papers about disability and the environment is by an American Women's studies professor, Valerie Johnson. She highlights the links between feminist disability studies and environmental justice and raises some important questions. She points out the implicit and unacknowledged assumption on which the environmental justice movement is based: that healthy environments are necessary in order to prevent people from becoming disabled.

## **Elderly Women**

Australia's population is ageing: Victoria's median age is expected to increase from 35.9 in 2002 to between 47.9 and 50.5 in 2051 due to a combination of falling fertility rates and increasing life expectancy (Australian Bureau of Statistics 2004). As women have a greater life expectancy than men, the majority of elderly people are women and thus the issues that face elderly people are predominantly women's issues. The problems faced by elderly women such as rising poverty rates, then, become more important as populations age (Enarson 1998). This will have significant environmental justice implications.

Filiberto, Wethington et al. divide age-related vulnerability into two categories: effects due to greater exposure due to having lived for a longer time and greater sensitivity due to some combination of physiological or social aspects of ageing, such as chronic illness or social isolation (Filiberto, Wethington et al. 2009). In terms of the physiological aspects of ageing, elderly people are more likely to suffer from chronic illness, functional limitations, sensory, physical and cognitive disabilities and frailty than younger people (AARP Public Policy Institute 2006). This significantly increases their vulnerability to environmental problems such as climate change. Elderly people are considerably more vulnerable to heat stress (Semenza, Rubin et al. 1996; Cheung, McLellan et al. 2000; Yaron and Niermeyer 2004; Ebi and Meehl 2007; Filiberto, Wethington et al. 2009; Yu, Vaneckova et al. 2010) as a natural part of the ageing process is a decline in the body's ability to control its temperature. Furthermore, social isolation correlates to risk of death during heatwaves (Ebi and Meehl 2007). In addition, older people, especially those with pre-existing respiratory conditions, are significantly more vulnerable to air pollution, which will increase with climate change (Filiberto, Wethington et al. 2009; Perera and Sandford 2011).

Elderly people are placed at great risk during natural disasters due to their decreased ability to mobilise quickly and effectively (Filiberto, Wethington et al. 2009), and they are more likely to die or be disabled by indirect causes such as heart attacks during evacuation (Filiberto, Wethington et al. 2009). According to the AARP public policy institute, 71% of deaths due to Hurricane Katrina were of people older than 60;

many of these victims died in their homes or in nursing homes, sometimes abandoned by their carers (AARP Public Policy Institute 2006). People older than 60 are generally over-represented in flood death statistics, and tend to be evacuated later during bushfires as they rely more heavily on the assistance of others (Haynes, Tibbits et al. 2008). Haynes, Tibbits et al. found that even though elderly and/or frail people had often made plans with people in their communities to help them evacuate in the case of bushfire, due to urgency many people were forced to look after themselves or their families first, leaving elderly people to an uncertain fate.

The effects of adaptation measures on elderly people must also be considered: one issue that has gained a lot of press in Australia recently is that of using bucket water from the shower to water the garden during water restrictions. Lifting heavy buckets of water can cause injuries, especially for elderly people who are more frail (Australian Physiotherapy Association 2008). This probably will have a disproportionate effect on elderly women as they are often still expected to perform housework at an age when men no longer work (Hansson 2007).

Although elderly women are in most ways more vulnerable than younger women to the effects of environmental problems, their knowledge and experience may be a source of innovation: in many cultural traditions elderly women transmit knowledge to younger generations, and their knowledge of adaptation measures and other issues may be an important and underutilised resource (Enarson 1998).

## **Women and Leadership**

A fundamental part of most, if not all, of the world's cultures is the public/private divide. This divide creates the assumption that women exist in the domain of home and family, and men in the public realm of leadership and decision-making (Kurtz 2007). Despite the fact that Australia currently has a female prime minister, the male domination of Australia's political sphere is over: however, only four of the twenty cabinet members are women (Department of the Prime Minister and Cabinet 2011) – if discrimination no longer existed, this number should be close to ten. Although gradual change has been evident over recent years, it is perilously slow and the obstacles preventing most women from being active in public life are still significant (Boyd 1997). Unfortunately, this is no less true in the area of environmental leadership and decision-making.

In any area in which subordinated groups have different needs, interests or opinions to dominant groups, adequate representation in leadership is crucial. As this review shows, women and men may have very different needs with regard to environmental justice. Nonetheless, leadership and decision-making surrounding climate change and other environmental issues are dominated by men at the national and international level (Kurtz 2007; Sze 2007; Buckingham and Kulcur 2009). For example, of the six largest UK environmental NGOs in 2008, all the boards except for one were heavily dominated by men (Buckingham and Kulcur 2009). This is reflective of a global trend; women worldwide represent only 13% of government

officials (Bhatta 2001). It has also been suggested that a certain “critical mass” of about 30-35% is required for women to support each other in policy initiatives (Bhatta 2001; Buckingham and Kulcur 2009), making the low proportion of female representation even more problematic. Women are also underrepresented in leadership and management of agricultural and natural resources, energy, petroleum, urban planning and infrastructure as well as international climate change negotiations (Milne 2005; Alston 2007; Hansson 2007).

The underrepresentation of women at high levels of environmental leadership and decision-making does not extend down to the grassroots level: at the level of community, membership and leadership of environmental organisations are often dominated by women, which is once again linked to the public/private divide; women are most visible in protecting their children, families and communities (Kurtz 2007). Women are powerful agents of change at the level of the family and the community (Aguilar 2009). For example, women’s traditional roles in the management of household food supplies and waste disposal (Buckingham, Reeves et al. 2005; Phillips 2009) may allow the transformation of the diets of entire families to more environmentally friendly produce and an increase in recycling. However, focusing on women’s power to effect change at this level may well contribute to the strengthening of gender stereotypes and further increase women’s domestic workload (Buckingham, Reeves et al. 2005; Buckingham and Kulcur 2009). Furthermore, it ignores the potential of women to provide leadership at national and international levels.

## **Conclusion**

This review reveals that women are likely to be disproportionately affected by environmental injustice, even in rich, developed countries such as Australia. The effects suffered by women may be loosely divided into three categories: those caused by economic inequalities, those caused by socially-constructed gender roles, and those caused by women’s increased life expectancy. However, these categories are not mutually exclusive: they are fundamentally related in the continuing inequality of women in our society and their effects may interact and amplify each other.

Some effects are already being felt: the vulnerability of elderly women to heat stress, for example, has already proved evident during heatwaves. Although many of the possible effects described in this review have yet to eventuate, the experiences of other countries should serve as a warning for the future: the disproportionate mortality rates of elderly and disabled women due to Hurricane Katrina in 2005 is a good example. At the very least, preparations must be made to reduce the potential impact of environmental injustice on women and other vulnerable groups. Environmental justice is fundamentally a matter of social justice. As such, it is an inherent obligation of governments, organisations and ordinary people to reduce the impacts of environmental problems as much as possible.

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