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# Environmental Change and Human Health in Upper Hunter Communities of New South Wales, Australia

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**Abstract:** This article presents the theory and method informing an ongoing study of environmental change and human distress in the Upper Hunter Valley of New South Wales (NSW), Australia. The nature of environmental change in the Upper Hunter landscape over the past two centuries is first described, followed by the preliminary results of a long-term study that aims to investigate the nature of residents' understanding of, and responses to, environmental change. Data from in-depth interviews found that the transformation of the environment from mining and power station activities was associated with significant expressions of distress linked to negative changes to interviewees' sense of place, well-being, and control. A new concept, ''solastalgia,'' is introduced to help explain the relationship between ecosystem health, human health, and powerlessness. We claim that solastalgia, as opposed to nostalgia, is a type of homesickness (distress) that one gets when one is still ''at home.'' Future research will aim to validate a questionnaire to test the hypothesis that environmental distress is associated with levels of depression, quality of life, and rates of stress-related disease, as well as activism and environmental rehabilitation.

**Key words:** ecosystem health, sense of place, place pathology, solastalgia, transdisciplinarity, environmental distress

## Environmental Change in the Upper Hunter Valley

The Upper Hunter region of New South Wales (NSW), Australia (see Fig. 1), defined by the catchment area of the Hunter River, has a 200-year history of intensive settler land use and associated major landscape changes, beginning with de-vegetation in the 19th century and continuing today with large-scale industrial activity focused on coal extraction and combustion. The term ''Hunter region'' is understood in many ways. In this article the term refers to the area delineated in the map (Fig. 1), which broadly corresponds to the catchment area of the Hunter River. The term ''Upper Hunter'' is the commonly used name for the NSW local government areas of Murrurundi, Scone, Muswellbrook, Singleton, and Merriwa. The scale of coal mining in the Hunter region has increased exponentially over the past 20 years, due largely to the expansion of open-

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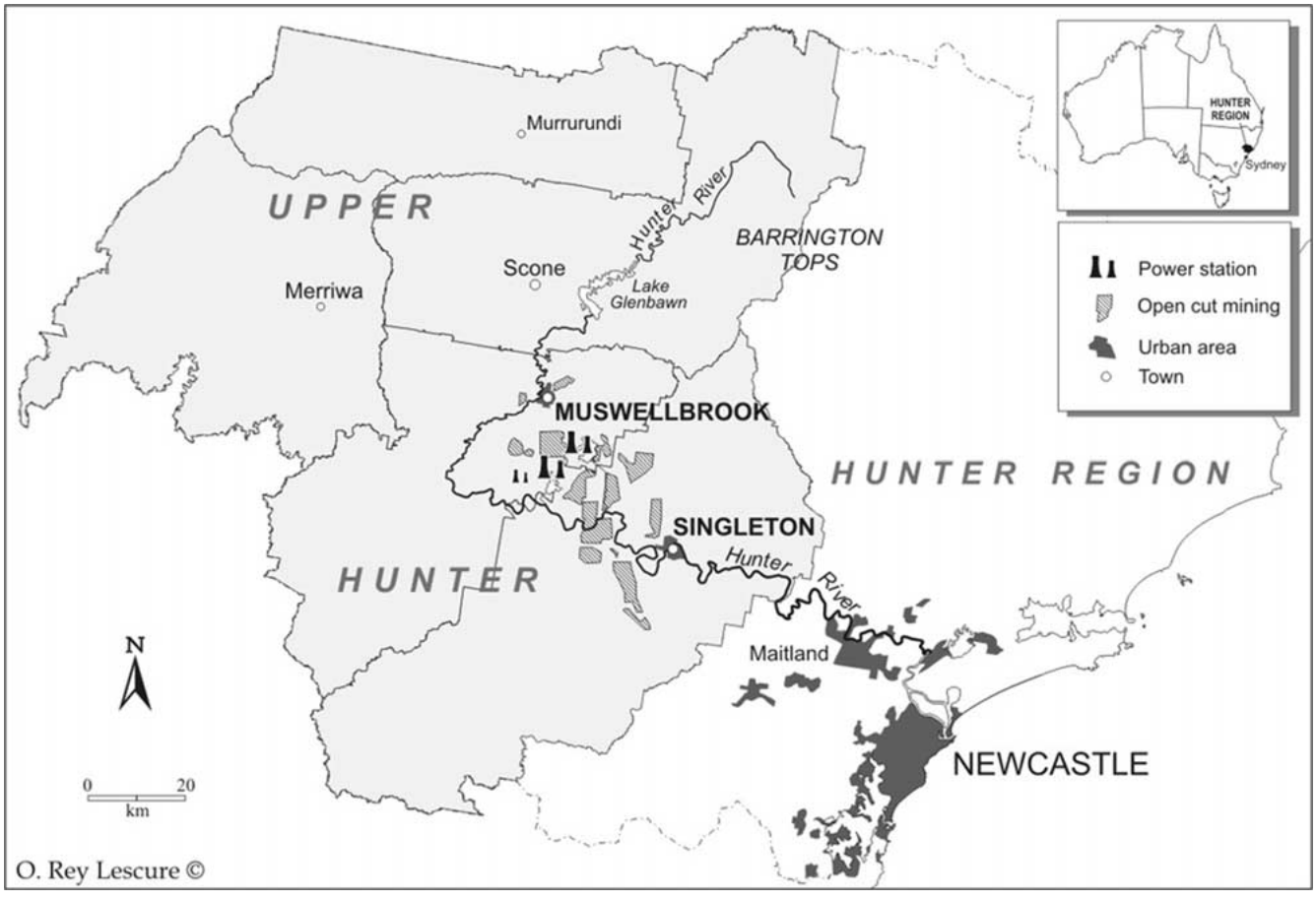


**Figure 1.** Map of the Hunter region, New South Wales. © O. Rey Lescure. Reprinted with permission.

cut operations. The area of land utilized for open-cut mining increased from 320 $km^2$ in 1988 to 520 $km^2$ in 1999, leading to public concern that ''the valley was turning into one massive quarry'' (Daley, 1999). The Upper Hunter is currently the center of coal production and is also the major generator of electricity for NSW with three coal-fired power stations located in the vicinity of the towns of Singleton and Muswellbrook (see Fig. 1). With the historical movement of the coal chain from the mouth of the Hunter River westward towards the Great Dividing Range, the process of landscape transformation continues unabated. Disturbance and rehabilitation is ongoing; it involves farmland acquisition, land clearing of remnant vegetation, open-cut extraction, degradation of surroundings through pollution by noise, dust, saline water, and other emissions, land subsidence, cracks in water courses, vibration from blasting, legally mandated efforts at rehabilitation, and further westward development. Open-cut mining and coal combustion for power generation in the Upper Hunter compete for resources with long-standing rural production, such as pastoralism, viticulture, horse studs, dairying, and high-grade stock-feed cropping, all of which depend on good water supplies and access to alluvial soils (McGuire, 2003; *Newcastle Herald*, June 2, 2003).

Newcastle, in the lower Hunter Valley, is the world's largest black coal exporting port. In 2000–2001, the Hunter region produced 109 million tonnes of raw coal, which represented 80% of the state's total (Hunter Valley Research Foundation [HVRF] 2003:88). Over 20 million tonnes of this coal was used for domestic consumption in the power industry and the balance was exported through the port of Newcastle. Upper Hunter coal production and combustion connects local communities with regional, national, and global political economies and ecologies, due to the high demand for finite supplies of fossil-fuel energy and problems with global warming and climate change. Australia's 24 coal-fired power stations are the largest source of greenhouse gas emissions on this continent, and Diesendorf (2003) estimates that their combined combustion produces about 180 million tonnes of carbon dioxide ($CO_2$) per

annum. The Upper Hunter power stations produce about one-third of these emissions.

In addition to landscape changes caused by major industry, the Hunter area has a long history of episodic environmental disturbance including fire, droughts, floods, and rising salinity in the water table and Hunter River due to land clearing (Fisher, 1995). The destruction of Indigenous land management practices, which were adapted to cope with and manage natural disturbances, has exacerbated the effects of fire and drought in particular (Flannery, 1994). During the 20th century, there was a diversification of agricultural and industrial activity in the Hunter Valley from mixed farming and coal mining to include viticulture, horse breeding, a proliferation of coal-fueled power stations, aluminum smelters, and associated service industries and infrastructure. The fuel requirements of power stations, and the immense voids carved by open-cut mining, have also led to proposals for various waste disposal industries in the Upper Hunter (Smith, 2002).

The results of this long history of environmental exploitation are clearly evident in the distressed ecosystem that now characterizes large sections of the Upper Hunter Valley. There has been a marked loss of biodiversity and water quality, as well as increased erosion, salinity, and siltation rates (Albrecht and Gutberlet, 2000). The power stations have high levels of fallout, especially sulfur dioxide, oxides of nitrogen, and particulate matter, and there are increased particulate emissions from the open-cut mines, and associated transport infrastructure—machinery, trucks, and trains. The Hunter River's water quality has seriously deteriorated as a result of past land clearing and mining; various river engineering and flood control projects have constricted its natural flow, and the increased flow of nutrients associated with agricultural and pastoral activities has resulted in large-scale algal blooms in waterways (see Healthy Rivers Commission, 2002). The loss of ecosystem health within the region as a result of the activities outlined above forms the background to our transdisciplinary study of residents' perceptions of ecosystem distress and their own distress, in relation to their sense of attachment to place.

## Relating Ecosystem And Human Distress

Growing international literature documents the direct health impacts of exposure to environmental degradation, defined as loss of ecological integrity or ecosystem health (Rapport, 1999). A good example is the pulmonary morbidity and mortality associated with fine airborne particulate matter (Dockery et al., 1993; Kjellstrom et al., 2002). Schwartz (2000) estimates that the death rate associated with airborne particulate matter triples for every 100 $\mu g/m^3$ increase; in the USA, particulates account for over 100,000 deaths annually, while in New Zealand, 2% of all annual deaths are attributed to air pollution (Fisher et al., 2002). Internationally, researchers have shown how air pollution from fossil fuel combustion (industrial and motor vehicle, including diesel exhaust) impairs respiratory and cardiovascular functions via inflammation of lungs, leading to thrombic complications, and modification of cardiac autonomic control and ischemia (Hertz-Picciotto and Brunekreef, 2002; Pekkanen et al., 2002; Tarkiainen et al., 2003). Globally, the health of 1.6 billion people may be at risk from poor urban air quality (Bickerstaff and Walker, 2001). When this concern is viewed alongside exposures from acid rain, ozone depletion, and global warming, we begin to appreciate the extent to which environmental degradation is placing at risk the health of the world's population (Rapport, 1999; Haines et al., 2000; Aron and Patz, 2001; McMichael, 2003).

Recent research seeks to document the impact of ecological disturbance on cultural and psychosocial health (Horwitz et al., 2001; Lebel and Burley, 2003; Noronha, 2003). A broad concept of the impact of mining on ''well-being'' underpins much of this new transdisciplinary work in the international context. Another approach used within Australia is to examine mediating processes, such as the individual's ''sense of place attachment'' or ''place identity,'' whereby places become part of personal identity and create a deep sense of belonging to that environment. Researchers postulate an ''interplay among the physical attributes of an area, people's conceptions and interpretations, and their actions and activities within the physical setting'' (Canter, in Horwitz et al., 2001, p 256). A strong sense of place identity and attachment may significantly mediate relationships between ecosystem distress and human health (Albrecht, 2001; Horwitz et al., 2001). The relationship between white settlement (as the primary manifestation of ecosystem distress, from an Indigenous perspective) and deleterious psychosocial health indicators for Indigenous people, is starkly clear in Australia, Canada, and elsewhere (O'Shane, 1995; Raphael et al., 1998). The psychological health of people living in rural landscapes, particularly with respect to suicide and depression, has

been linked to a variety of factors, including access to firearms, unemployment, financial difficulties, and sense of personal loss of control over destiny (Booth et al., 2000). However, as Horwitz et al. argue:

> Rarely is environmental change regarded as a possible contributing factor, yet landscape degradation, manifesting as soil erosion, river or wetland degradation, or increasing salinity on previously productive land, may underlie or exacerbate any of these other contributing factors (Horwitz et al., 2001, p 255).

Research evidence suggests substantial psychosocial morbidity in response to a range of environmental stressors. Baum and Fleming (1993) summarize a decade of data they gathered on the long-term reactions of people living near the Three Mile Island nuclear power station, other hazardous waste sites, and those exposed to toxic chemical spills. They report that victims of human-made accidents involving toxic chemicals or radiation show long-term elevations of blood pressure, sympathetic arousal, endocrine levels (cortisol), greater reported distress (somatic symptoms, anxiety, depression, threat, post-traumatic stress disorder [PTSD]) poorer task performance, and a perceived loss of control relative to people not exposed to such hazards. Prominent were persistent symptoms of emotional distress and arousal associated with uncertainty and concerns about future health (Baum and Fleming, 1993, p 670). Elsewhere, Havenaar et al. (1996) found high levels of emotional distress and psychiatric disorders combined with other mental health problems among residents living in the area affected by the Chernobyl disaster. Investigating the dioxin exposure in Seveso, Italy, the 10-year observation by Bertazzi et al. (1989) concluded that elevated rates of cardiovascular mortality were associated with the stress of the dioxin event.

Elliott and her associates have measured psychosocial impacts of exposure to environmental contaminants in a dozen Canadian communities. Elliott's surveys and interviews report concern, anxiety, and uncertainty over the possible health, nuisance, and property value effects of waste disposal activities (Taylor et al., 1991). Large majorities are concerned about urban air pollution and the significant lifestyle disruption it caused. In relation to landfill siting processes, residents express feelings of loss of control, deep mistrust of others, sense of powerlessness to influence risk, as well as negative emotional effects such as worry, anger, and despair, increased tension and division within the community, and loss of sleep (Wakefield and Elliott, 2000). Among people living near a petroleum refinery, those perceiving odors more frequently were more likely to report cardinal symptoms (nausea, wheezing) and general adult health symptoms (headaches, dizzy spells), while negative impact overall was most intense for people who had a greater sense of attachment to that locality (sense of place).They were unhappy that the refinery was in their community, believed it caused ill health, and provided few local benefits (Luginaah et al., 2002). When Elliott's group studied the psychosocial health of communities within the Aral Sea disaster region (dry, toxic soil), they found somatic symptom scores comparable to those of residents living close to the Three Mile Island reactor 1 year post-accident; nearly half the respondents were concerned about the environment, particularly water, air, land soil quality, and felt these problems were responsible for health problems (Crighton et al., 2003). Elliott's pattern of results is echoed in similar studies carried out in intense industrial areas of northern England (Howel et al., 2002, 2003; Moffatt and Pless-Mulloli, 2003).

## Relating Ecosystem and Human Distress in the Upper Hunter Region

In Australia, epidemiological studies link outdoor air pollution with respiratory disease in children in cities with steel production, while proximity to power stations is associated with lower lung function and higher rates of reported symptoms for asthma in children 5–12 (Henry et al., 1991; Halliday et al., 1993; Lewis et al., 1998). No formal epidemiological studies have been carried out in the Upper Hunter region, however, strongly held community perceptions expressed in newspaper articles and letters, and talk-back radio, suggest that residents in the area suffer high rates of illness from power station emissions, dust, and other industrial pollutants (Dalton, 2003). In addition, newspaper reports of community mobilization (Smith, 2002; Sneddon, 2002), letters to the editor (Bourne, 2002), calls to the NSW Government Environmental Protection Agency hotline (EPA, 2003), and concerns expressed at Community Consultative Committees for various Upper Hunter mines and power stations (e.g., Macquarie Generation, 2002) suggest there is considerable concern about various industrial activities in this region.

## Purpose of the Study

Our transdisciplinary investigation, synthesizing multiple disciplinary methods and concepts into a common framework (Albrecht et al., 1998; Higginbotham et al., 2001), explores the proposition that the psychological well-being of individuals and their sense of place identity have been challenged by perceived degradation and transformation of the local landscape. During 2003, a qualitative study was undertaken to provide preliminary information essential to developing a larger scale transdisciplinary investigation assessing the relationship between "ecosystem distress syndrome" (Rapport and Whitford, 1999) and human distress in Upper Hunter communities. Ecosystem distress syndrome is characterized by the dominance of mechanisms of degradation in a particular ecosystem that become self-reinforcing (Rapport and Whitford, 1999).

The study aims to:

1) gather primary qualitative data documenting residents' perceptions of environmental change and threats arising from the expansion of open-cut mining and other industrial activity;
2) identify indicators of distress (emotional, psychological, behavioral, and social) linked to environmental degradation; and
3) identify dimensions of individuals' place identity and attachment to locality.

Furthermore, based on these qualitative data, a survey instrument is being developed to give a more representative account of people's reactions to environmental change in the Upper Hunter. The Environmental Distress Scale (EDS) will produce information that is both specific to the endemic qualities of individual sites and generalizable across locations through the use of standard pre-coded scales. Future funding is being sought to validate the EDS using comprehensive biological, medical, mental health, and quality of life data.

## Methods

Interviews were undertaken with 13 key informants identified as stakeholders in the issue of landscape degradation and human responses to it. They included health professionals, local council planning officials, elected local government councillors, coal industry management, and a formal community lobby group. In addition, phone calls were made to officials from various local and state government departments seeking technical information on such issues as rural lands protection, mineral resources policy, Joint Coal Board jurisdiction, and an overview of veterinary health of cattle in the Upper Hunter. Recruitment of key informants occurred through analysis of local and regional newspaper archives and consultation with local government officers and environmental activists. Open-ended interviews were conducted using a prepared interview guide focusing on the themes of landscape change, environmental history, air quality change, indicators of distress, and aspects of individual place identity.

In-depth semi-structured interviews addressing these same themes were undertaken with 42 community residents (including group interviews). Participants' occupations included: farming, teaching, clerical, mining, home duties, social welfare, health professions, vehicle mechanic, and other professionals. Older and younger residents with a long family connection to Upper Hunter communities were purposively selected to gain the views of people with a personal or family history of experiencing environmental change. More recent migrants to these areas have also been recruited. Community interviewees were recruited via community organizations, project media releases, and other third parties, using a postal recruitment questionnaire.

Using the NVivo qualitative data management software (QSR International, 2002), interview transcripts have been coded into 11 broad categories: Point Source of Pollution, Environmental Change, Sense of Place, Social Relationships and Resources, Responses to Environmental Change, Distrust, Mental Health, Physical Health, Risk, Justice, and Economic Factors. Preliminary findings from exploration of the common and contrasting themes are presented below.

## Preliminary Results and Analyses

For many of those interviewed, environmental change in the Upper Hunter is associated with considerable depth of feeling of personal distress about loss of, or damage to, homes, farming properties, the landscape, and community heritage. Emotional wounds were especially evident in relation to destruction of family homes and farms, creeks and watershed—places steeped in personal and kinship history, and offering definition to a way of life. The

relentless changes to these places, and the perceived indifference to these losses both by industry interests and government agencies, were deeply upsetting to residents, some of whom described the degradation of lands held in family hands for more than 100 years.

We appreciate that these responses were not from a representative sample of the Upper Hunter population. In particular, our preliminary study did not specifically seek out Indigenous residents. In addition, the expression of distress cannot always be teased apart from the hardships occasioned by the regional restructuring of rural industries, such as dairying, and the decline of small mixed farms (McGuire, 2003). Nevertheless, the research team came away from these interviews with the realization that we were not simply recording a series of environmental insults, endured in the interest of development. Rather, we were chronicling the passing of an entire way of life in this region: The symbiotic and long-term relationship between settler farming practices and land productivity has been replaced by expedient and efficient mineral exploitation and power generation. Once the land is mined, even a remediated landscape is one that represents severed links between place and identity. As the coal industry moves to new exploitable coal measures, the communities left in its wake must deal with the resulting degraded landscape and fractured social relationships. The impacts of the power generation industries look likely to be even more widespread, with more power generation capacity to be built in the region in the near future, and there is now widespread discontent about the number of new development applications for open-cut coal mines.

All interviewees acknowledge the wealth that mining expansion and power generation have brought to the region. Singleton is one of the highest income areas in the Hunter Valley (HVRF, 2003). However, increased wealth has not necessarily been achieved with a net increase in local jobs. Technology and capital-intensive mining has seen a reduction of jobs in some sectors of mining, while union representation of miners has also declined. Most of the community members interviewed view industrial development as a mixed blessing. The high wages paid in the mining industry, and the changes to the organization of work, are perceived to have deepened social divisions in the community. Higher cost of living, rapid turnover of neighbors, and mistrust between supporters and opponents of industrial expansion are the harsh side-effects of the new wealth. There are varying levels of fear about health risks to humans and the environment, and differing levels of commitment to a range of economic, social, or cultural values and priorities in developing the Upper Hunter for the future. In many respects, these concerns are similar to those reported for other communities affected by large-scale industries such as mining (see, for example, Moffatt et al., 1995; Moffatt and Pless-Mulloli, 2003).

Three broad interrelated themes appear to characterize our respondents' expressions of distress: threats to ecosystem health, threats to personal health (mental and physical), and perceptions of being subjects of environmental injustice. An ecosystem approach to understanding the totality of health for this geographical community involves exploring the connections between these three themes. For example, is the relationship between the physical health of one's ecosystem and one's personal health mediated by the perceived ability to influence the health of the environment? While we have not yet completed in-depth analyses, examples of distress related to each of the themes can be highlighted:

1. The extent of physical change to the environment (natural and built) and the loss of ecosystem health is evident in the following statements:

   > The Hunter River, I know we've said a lot about it, but I remember as a kid . . . that it used to have a very, very beautiful light granule white sand. It had beautiful sand in that river and now it is black rubble . . . and it's very shallow. (Simon)

   > Originally they [the miners] said they were going to go underground but the DA [development application] . . . is for open cut . . . Now that is the danger. Species there, there is a very rare woodland banksia in all of that. And it's distressing. It almost reduces me to tears to think about it [mining]. When the coal is gone, the people of Singleton will be left with nothing but the final void. (Eve)

   > . . . and certainly K . . . has this property out there for birds and things like that and he just, he makes me cry at times because . . . he'll ring me up and say, "You should see the color of the creek." It's that real empathy with the land and the changes that he's seen since he was a child. (Brenda)

   > You find with the coal mines, you know, and the westerly winds we get here, you get that black deposit, coal dust, on your roof and everywhere like that, which ends

up in your [water] tank. And also when you hang your clothes out, you're trying to hang the washing out, you've got to wipe down the clothesline, black streaks on it, and that's in the air anyway. (Bowie)

The fact that you can see those huge mine heaps, etc., makes you think that some time in the future there may be dreadful consequences for the water table movement in the valley, etc. (Leo)

Now then, they wanted to change [name] Creek. They wanted to go right under the alluvial soils, where we have the farm, all that lovely soil, they wanted to go right up to the river. And we just all jacked up. Admittedly, I was in the forefront of doing that because of what they did just here, here at the [name] mine next door, and they were allowed to alter [name] Creek. And they took it from that side and they put it now round that side. And I had a man ring me up and say there's a mother platypus and three babies dead because they've taken the water away. (Dora)

In the situation of the old [name] colliery, it was disgusting. The coal there was very high in sulfur and they did a small open-cut, and all open-cut voids cannot be completely filled because you've taken the coal out, you see, and you haven't got the complete overburden to put back, so they've left a rock face full of this sulfate rock which is just, I'll say it, spewing out sulfuric acid, and that has to eventually flow down into the creek, and who is going to control it? (Faith)

2. The impact on physical and psychological health is a dominant theme:

One of the reasons they [my ancestors] left the north of England was on the physician's recommendation because they were suffering from respiratory problems and consumption ... the child mortality rate was pretty high ... they had steam engines roaring past the house, and black smoke and soot. Yes it's gone round in a big circle. It took a 150 years, they came here to get away from it and they did. They said what a wonderful country it is and it's caught up, the industrial revolution's caught us again, we've got the same trouble. Where do we go, Patagonia or somewhere? (Howard)

Well, my wife ... she's totally allergic to sulfur. So I want rainwater where I am, but with the catchment and the dust and everything that I get down, I buy all our drinking water for her sake because she's totally allergic to sulfur ... always has been. (Bowie)

The other concerns that I have are that we seem to have a high incidence of cancer. Even younger people are getting cancer. It seems to be, from what we have seen, brain cancers and rare ones. (Fleur)

The environmental issues have certainly affected my health as in the physical, but emotionally, again its hard to quantify how much stress and emotion plays in somebody's health, but I certainly know that when things are running on an even keel, if that's the right word, if you don't have those issues that you feel like you've got to really stand up and fight, and are you the only one that's doing anything? You always find out that you're not the only one that's doing something but at times you feel . . . is anybody out there listening? I know how much worse my asthma is. (Brenda)

Well, I noticed when this business with [mine name], when I was really fighting here. And my [farm] manager would come to me and say he didn't sleep last night. The noise, because they're loading right near the road, he's just across the creek from the road and you hear a drag line swinging around and dumping rocks into a truck. And then the truck would back away . . . beep, beep, beep, beep, beep. And then the next one would roar in. He used to say to me "We just can't cope any longer." They wouldn't listen. I then had to go to the mining company. I went to my solicitor . . . But I lost a lot of weight. I'd wake up in the middle of the night with my stomach like that [note: clenched fist], and think, what am I going to do? We're losing money, they won't listen to me, what do I do? Do I go broke? I can't sell to anybody, nobody wants to buy it because it's right next to the mine. What do I do? And I was a real mess. (Dora)

Two people I spoke to said, "If coal trucks are coming past my place (I'm a very bad asthmatic, I'm having trouble as it is), I'm moving, my house goes up on the market." There are people that are very close to the mine and they've been putting a big effort in, and [one

of them] he just shakes his head sometimes and says, "Oh God, I don't know what I'm doing." He's that worked up about it. (Doreen)

3. Environmental injustice and political powerlessness also cause deep distress:

I think one of the problems of the mining and the industry is, they play on the basic everyday person's lack of resources. There's no social support for displacement, none whatsoever. (Isabelle)

And it's a big thing when your family has owned the place for generations. You love that land, even through I married into it. I came to love it because I knew the history of it . . . . And I thought, the love of that place, it doesn't mean anything now that we've got all those wretched international companies. They don't care. (Dora)

It's a very stressful position to be in because these companies really put a lot of pressure on you, and particularly for anyone who's been bought out by a mine. Like you're totally displaced and you're basically given the idea that you're going to be put out of your home whether you like it or not, you know? And I think there's a lot of people in the area who have been affected in that way, that have been basically pushed around by heavy industry. (Phillipa)

Certainly I believe that there are a greater number of impacts on Singleton than any other communities, specially the Hunter. But certainly . . . other communities are also being impacted on and people are feeling the same way as we are. That sense of no power to do anything, that there's no way of stopping what's happening around you without a fight. And people are tired, you know, we just get rid of this issue and the next issue's waiting and so on, it's like a conveyer belt of issues. And there could be two or three issues sitting on the table at the same time. (Brenda)

Coal mining, there has never ever been a coal mine knocked back in NSW, doesn't matter who says what about anything, and I think people know that, and so people know and they give up before they get to first base because these people have got the media, the publicity departments, and all the money to back them. A lot of people look at it, get angry and frustrated, and a lot of people just choose to let it brush over them because people see how it affects those that do actually get involved, and they don't want to become that emotional and that distressed. (Jay)

Some respondents report being under considerable pressure because the mining companies did not compulsorily acquire their properties in the initial stages of mining operations. These individuals cannot readily pack up and leave; they remain in an area that was their location of choice or part of their family heritage, but now they experience the destruction of nearly all aspects of life that once provided them with a sense of place and an identity tied to the distinctive qualities and features of life in rural Australia. Some of the very elements that make rural life attractive—clean air, fresh water, scenic landscapes, and endemic biodiversity—were being negatively affected by the transformations and pollution inflicted by the two coal-based industries. In the Upper Hunter, people were suffering from both imposed place transition and powerlessness (environmental injustice).

What emerges clearly from the interviews is distress caused by the challenges to our informants' senses of identity, place, belonging, control, and good health. Their frustration at not being able to stop or reverse the development that was causing the desolation of the environment and the loss of their sense of well-being added to the cumulative distress. Among our respondents, mental and physical suffering were intertwined and were articulated both verbally and through body language such as a "clenched fist" to denote inner feelings. Linguistically, the use of possessive phrases such as "our platypus" and "our river" expressed deep emotional ties to endemic features of their "place as an interactional context" (Pretty et al., 2003, p 284).

In contrast to our Upper Hunter observations, the literature on place change elsewhere in Australia (Cameron, 2000; Pretty et al., 2003) and internationally (Fullilove, 1996; Manzo, 2003) is concerned mainly with the emotional and psychological impact of forced or voluntary relocation and the loss of place. Peter Read's *Returning to Nothing: The Meaning of Lost Places* (1996) explores the experiences of people migrating away from places that have been, or are about to be, obliterated. Read documents the emotion and distress of people in such circumstances. His chapter on the (former) town of Yallourn in the brown coal region of the La Trobe Valley of Victoria, graphically cap-

tures the distress caused by open-cut mining dispossession and loss of attachment to place. Read concludes that in addition to the cultural significance of the diversity of unique places "Loved sites are worth preserving because of the intense pain which their destruction may cause to the inhabitants of those places" (Read, 1996, p 197). In many respects, such distress is repeated in the Hunter Valley; there have been many people whose properties have been acquired by mining companies and then obliterated. The former owners have relocated themselves to new locations that they hope will never be subject to such disruption again. However, this study has not yet focused on the relocated people of the Upper Hunter nor their "lost places." For Indigenous Australians, distress may be even more fundamental as some Indigenous groups consider that "culture comes from the land itself" (Cameron, 2000). The additional element of lost spiritual connection to the land, in the case of Upper Hunter Indigenous groups, is another aspect of place-based distress that this study has yet to explore.

In overview, our initial qualitative study has stimulated exploration of the conceptual space of connection between human health and identity within the zones of high impact in the Upper Hunter region. It appeared that the Upper Hunter region was exhibiting many characteristics of ecosystem distress syndrome and "place pathology" (Casey, 1993, p 38). Place pathology involves a variety of symptoms including "disorientation, memory loss . . . depression, and various modes of estrangement from self and others" (Casey, 1993, p 38).

The people we interviewed were still in their place or "at home" but that place was in a state of negatively perceived transition. Moreover, the interviewees in the Upper Hunter were concerned about the breakdown in their health, the health of their families, and communities, and ecosystem health. At risk were the connections between people and place, maintained through daily activities and past experiences, by which the "self" is located within the environment (Pretty et al., 2003, pp 274–275).

## Conclusions: Solastalgia

In order to better understand the dynamic between the three themes discussed above, team author Glenn Albrecht has created a new concept of human identity in relation to place, that of "solastalgia" (discussed in greater detail in Albrecht, 2004). Solastalgia has its origins in *solacium* (solace) and *algos* (suffering, grief, or pain) and has a ghost reference and structural similarity to nostalgia (*nostos*) to give a place reference. It refers to the specific distress caused by the negatively perceived transformation of one's home and sense of belonging. It is a concept that has close affinities with "nostalgia." Nostalgia was considered to be a medically diagnosable psycho-physiological disease right up to the middle of the last century. In the early 20th century, nostalgia was defined as a form of melancholy caused by homesickness. Lowenthal (1985), for example, discusses cases of severely homesick soldiers fighting on foreign soil who were medically repatriated to recuperate and restore their well-being.

Solastalgia, by contrast, relates to the melancholia or pain experienced when there is recognition that the place where one resides and that one loves is undergoing imposed transformation. It is manifest in an attack on one's sense of place, in the weakening of the sense of belonging (identity) to a particular place and a feeling of distress (psychological desolation) about its transformation. Solastalgia is not about looking back at some golden past, nor is it about seeking another place as home; it is the "lived experience" of intense change, manifest in a feeling of dislocation and of being undermined by forces that destroy the potential for solace derived from the present. In short, solastalgia is a type of homesickness one gets when one is still "at home."

In some respects, the people in the Upper Hunter region are experiencing a wave of aggressive colonization by large-scale, extractive, and power-generating industries owned by state, national, and multinational corporations. The first wave of colonization dispossessed the Indigenous people of the Hunter Valley. The second wave of colonization, ironically impacting on some of the descendants of the original colonists, is leading to complete dispossession for some (those that are compulsorily acquired) and solastalgia for others (those who stay living with the insults).

Our qualitative investigation sought to explore residents' perceptions and feelings about changes to ecosystem and human health within the region. Our preliminary analyses of interview transcripts suggest that the themes of ecosystem health, human health, and powerlessness are deeply interrelated. The new concept of solastalgia has been created to help elucidate this complexity and to distinguish it from different forms of place-specific distress. While our research is in its early stages, we hope that our emerging conceptualization of the dynamic relationships between human and ecosystem health revealed in the Upper Hunter

study has the potential to be usefully applied to other research contexts, especially those connected to large-scale industrial developments.

**Résumé: Cet article présente la théorie et la méthode qui inspirent une étude en cours sur les changements environnementaux et la détresse humaine dans l'Upper Hunter Valley en Nouvelle-Galles du Sud, en Australie. La nature des changements environnementaux survenus dans le paysage terrestre de la vallée au cours des deux derniers siècles est d'abord décrite, suivie de la présentation des résultats préliminaries d'une étude long terme visant connatre comment les habitants peroivent le phénomène et leurs réactions. Les données recueillies au moyen d'entrevues approfondies ont mis en évidence que la transformation du milieu entraînée par les activités miniéres et les centrales électriques était associée á des expressions d'angoisse marquées liées aux changements négatifs intervenus dans le sentiment de stabilité, de bien-être et de maîtrise des événements. Un nouveau concept, celui de ≪solastalgie≫, est présenté pour aider á expliquer la relation entre la salubrité de l'écosysteme, la santé humaine et un sentiment d'impuissance. Nous avanons que la solastalgie, par opposition á la nostalgic, est une forme de mal du pays (angoisse) qu'une personne ressent alors qu'elle est encore ≪chez elle.≫ La recherche á venir s'attachera á valider un questionnaire qui testera l'hypothèse d'un lien entre la perturbation de l'environnement et la dépression, la qualité de vie et les maladies causées par le stress, ainsi qu'á l'activisme et á la remise en état de l'environnement.**

**Mots clés: salubrité de l'èkosystéme, sentiment de stabilité, pathologie d'appartenance, solastalgie, transdisciplinarité, perturbation de l'environnement**

**Resumen: Este artículo presenta la teoría y el método que conforman las bases de un estudio en curso sobre cambios ambientales y aflicción humana en el Upper Hunter Valley de Nueva Gales del Sur, Australia. Comienza describiendo la naturaleza de los cambios ambientales que han ocurrido en el paisaje del Upper Hunter durante los últimos dos siglos, para luego entregar los resultados preliminares de un estudio a largo plazo que se propone investigar la manera en que los pobladores entienden y responden al cambio ambiental. Se hicieron entrevistas detalladas, cuyos datos mostraron que la transformatión ocurrida en el medio ambiente, debido a actividades mineras y centrales eléctricas, se vinculaba a expresiones significativas de aflicción, asociadas con cambios negativos en la sensatión de lugar, bienestar y control. Se introdujo un nuevo concepto, "solastalgia," para ayudar a explicar la relatión entre salud del ecosistema, la salud humana y la sensatión de impotencia. Afirmamos que la solastalgia, en tanto opuesta a la nostalgia, es un tipo de añoranza (aflicción) que se siente al estar incluso "en casa." La investigación futura apuntará a validar un cuestionario para probar la hipótesis que la aflicción causada por cambios ambientales se asocia con niveles de depresión, calidad de vida y tasas de enfermedades relacionadas con el estrés. También abordará asuntos relacionados con activismo y rehabilitatión ambiental.**

**Palabras clave: salud del ecosistema, sensación de lugar, patología de lugar, solastalgia, transdisciplinariedad, aflicción ambiental**

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