

# Producing Contaminated Citizens: Toward a Nature–Society Geography of Health and Well-Being

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A nature–society geography approach to health and well-being demonstrates that socioecological parameters, in addition to economic and political factors, are critical to explaining outcomes of health crises. In expounding on this multifaceted understanding of health and well-being in the context of development, I draw on research on chronic arsenic poisoning and water contamination in rural Bangladesh. A public health crisis has arisen from naturally-occurring arsenic poisoning millions of people who drink, cook, and irrigate with arsenic-laced groundwater pumped up by tubewells, where the very sources that were promoted to bring health are now bringing illness, hardship, and death. In examining the interlinked ways that arsenic and water come to influence well-being and illness, I pay particular attention to social stigma and the production of contaminated citizens. By engaging the insights from nature–society geographies of health and feminist geographies of well-being in contributing to scholarship in geographies of health, the article highlights that the experiences of health and well-being are complex and evolving in instances where slow poisoning is simultaneously an outcome of development endeavors and environmental factors. *Key Words:* arsenic, health, nature–society, stigma, well-being.

健康和福祉的自然—社会地理方法表明，除经济和政治以外，社会生态学参数，是解释健康危机结果的至关重要的因素。我在阐述发展的背景下，多方面了解健康和福祉这一问题，研究孟加拉国农村的慢性砷中毒和水污染情况。因使用泵管井泵出的含砷地下水喝，做饭，和灌溉而自然地发生在百万人身上的中毒现象，已经导致了一场公共卫生危机。这一水源原本被认为会带来健康，现在带来的是疾病，困苦，和死亡。通过审议影响福祉和疾病的砷和水相互关联的方式，我特别关注社会耻辱和污染公民的产生。通过洞察自然与社会健康地理和促进健康地理学术发展的女权地理的福祉，文章强调，健康和福祉的经验是复杂的，是在慢性中毒同时作为发展的努力和环境因素的一种结果的大情况下发展的。*关键词：*砷，健康，自然—社会，耻辱，福祉。

Abordar el tema de la salud y el bienestar con el enfoque geográfico expresivo de la relación naturaleza–sociedad demuestra que los parámetros socioecológicos, además de los factores económicos y políticos, son cruciales para explicar lo que sobreviene de las crisis de la salud. Para una mayor elaboración de esta manera multifacética de entender la salud y el bienestar en el contexto del desarrollo, me baso en investigaciones sobre envenenamiento crónico con arsénico y aguas contaminadas en el espacio rural de Bangladesh. Ha surgido una crisis sanitaria por el envenenamiento de origen natural entre millones de personas que beben, cocinan y riegan con agua cargada de arsénico, la cual es bombeada a la superficie a través de pozos entubados, donde las propias fuentes que se abrieron para traer salud están ahora aportando enfermedad, sufrimiento y muerte. Al examinar los entrelazamientos por medio de los cuales el arsénico y el agua llegan a influir bienestar y enfermedad, pongo particular atención al estigma social y a la producción de ciudadanos contaminados. Al buscar las luces de las geografías de la salud inspiradas en la relación naturaleza–sociedad y las geografías feministas del bienestar para contribuir de manera académica específica a las geografías de la salud, el artículo destaca que las experiencias de salud y bienestar son complejas y evolucionan en instancias en las que el envenenamiento lento puede ser simultáneamente un resultado de propósitos de desarrollo y de factores ambientales. *Palabras clave:* arsénico, salud, naturaleza–sociedad, estigma, bienestar.

Health geographers have significantly contributed to debates about health, place, and well-being in a variety of contexts globally (for overviews, see Gatrell and Elliot 2009; Brown, McLafferty, and Moon 2010; Kearns and Collins 2010). Given the linkage among health, well-being, and overall social

development, it is critical to look at the multifaceted ways that various health concerns affect people's everyday lives and opportunities to be healthy (Kearns and Andrews 2010). Critical scholars of nature–society geography have been enriching existing literatures in recent years by more forcefully engaging with

environmental and social systems simultaneously. Mayer (1996, 2000), Mansfield (2008, 2011), and King (2010) have pointed to fruitful avenues of research that engage nature–society geography, especially insights from political ecology, highlighting the salience of broader political economy and the environment to explanations of health and well-being. Such perspectives have also shifted the dominant focus from infectious diseases to exploring various aspects of environmental change and impacts on human health, such that health is understood as inherently a nature–society issue. Critical political ecology of noninfectious health is thus an emerging body of scholarship that is contributing to such debates (e.g., McGee 1999; Eyles and Elliott 2001; Richmond et al. 2005; Sultana 2006, 2007b; Hanchette 2008; Biehler and Simon 2011). To this end, political ecologies of health are being contextualized more broadly within development interventions, where environment–development contradictions animate the trajectories of public health debates in the global south, as this article demonstrates.

Engaging such insights with those from feminist geography provides further nuanced ways to analyze health and well-being. Scholarship in gender and health has specifically emphasized the ways that well-being is closely tied to notions and experiences of gender (Dyck, Lewis, and McLafferty 2001; Moss and Dyck 2002). Feminist geographers have richly debated and elucidated the ways that embodied notions of well-being are important to explaining the everyday ramifications of chronic illnesses to life and livelihood (Chant and McIlwaine 2009; Del Casino 2010), as well as the ways that gendered embodiments are constructed, challenged, and experienced in everyday spaces and practices (Longhurst 2001; Sothorn and Dyck 2010; Sultana 2011). Informed by such insights, I analyze chronic arsenic poisoning from contaminated drinking water in Bangladesh. I demonstrate the importance of investigating the complex intersections of social processes, environmental change, and embodied well-being to shed greater light on the nature–society geographies of health and well-being.

### **Arsenic Poisoning: The Making and Unmaking of a Public Health Success Story**

In 2000, the World Health Organization (WHO) declared that arsenic poisoning of nearly 30 million people in Bangladesh was the “largest mass poisoning of

a population in history” (Smith, Lingas, and Rahman 2000, 1; WHO 2000). Such a claim alluded to, and brought international attention to, the severity of the problem of drinking water contamination by naturally occurring arsenic. People had been drinking, cooking, and irrigating with arsenic-contaminated water for years, in response to the promotion of using groundwater from aquifers in previous decades through development policies aimed to provide “safe” groundwater for human use. As groundwater was already contaminated with arsenic unknown to people at first, however, the usage of groundwater for human consumption continued for many years and exposed unsuspecting societies to slow poisoning from arsenic. As the situation was increasingly becoming dire, scholars in various fields started to undertake research on the arsenic crisis in Bangladesh, predominantly from public health, epidemiological, geological, and policy perspectives but also from critical social and geographical perspectives (for greater detail, see Ahmed and Ahmed 2002; Ahmed 2003; Paul 2006; Sultana 2006, 2007a, 2007b, 2009b; Atkins, Hassan, and Dunn 2007).

The tragic irony of the crisis arises from the fact that carcinogenic arsenic occurs naturally in the sediments of the delta aquifers, thereby making arsenic enter socioecological worlds through abstraction of groundwater by tubewells that are used for domestic and irrigation purposes. Tubewells were heavily promoted by the state and development institutions in the 1970s and 1980s as part and parcel of development planning in safe water provision in much of South Asia, to reduce waterborne diseases (e.g., cholera, diarrhea, etc.) that led to high infant mortality and morbidity rates (Briscoe 1978). The goal of development endeavors was to reduce overall incidences of illnesses from polluted water consumption through the large-scale introduction of tubewells that would pump up “safe” groundwater (as aquifers were largely free of pathogens). Groundwater was deemed a safe alternative and one that was available in abundance in the delta (and annually recharged by the monsoonal climate). This was heralded as a public health success story, and it was touted around the world that rural populations had switched over to drinking safe groundwater within only a few years.

Yet the presence of arsenic was not tested for in the 10 million tubewells that were installed by government, nongovernmental organization (NGO), and private funding. This situation enabled millions of people to consume groundwater with the belief that they were drinking safe water. Although this water was largely free of living contaminants, it was laced with the

nonliving contaminant of carcinogenic arsenic. Because it is impossible to detect whether water is arsenic-free from taste, color, or smell, people continued to drink deadly water. Scientific testing is needed to identify whether trace amounts of arsenic exist in the water or not and whether the allowable limits have been exceeded. Chronic exposure to small amounts of arsenic over years causes arsenicosis (arsenic poisoning), which leads to various health problems, such as skin spots (melanosis, keratosis), cancer, organ failure, and ultimately death. Given the time frame of about five to fifteen years for chronic arsenic poisoning to manifest physical symptoms, it was not until growing numbers of people showed signs of arsenic poisoning in the late 1990s that development planners and policymakers started to come to grips with the rapidly escalating problem. Estimates of 30 to 35 million people consuming arsenic-laced water quickly came to underscore the enormity of the crisis, and the statistics of people not only exposed to drinking contaminated water but also falling ill were expected to rise over time. The rising number of people manifesting signs of arsenic-related illnesses prompted a large-scale awareness and information-sharing campaign throughout the country, heavily funded by the same international donor institutions that were responsible for promoting the tubewells in the first place.

Despite the awareness campaigns and testing of water quality, millions of people have continued to drink arsenic-contaminated water, largely due to lack of viable safe alternatives. The uncertainty about the amount of arsenic in the aquifer, and subsequently in drinking water, confounded early attempts to convince people that their tubewell water was no longer safe. Skepticism and concerns about the quality of alternative water sources kept many households from switching away from groundwater on which they had come to depend. The risk substitution involved weighing very difficult options for each household: either consuming pathogen-contaminated water and falling ill immediately (especially if insufficient resources existed to obtain fuel wood to boil the water or treat it with some other method) versus taking a chance of risking long-term illness from arsenic but having almost no immediate ill health. Such decisions became more complicated when officials tested the water in a national water screening program in 2001 and 2002 and identified contaminated tubewells with different colors: safe tubewells' spouts were painted green and unsafe tubewells' spouts were painted red (British Geological Survey/Department of Public

Health Engineering 2001). Red-painted tubewells had arsenic in concentrations above 50 ppb (parts per billion), whereas green-painted tubewells had concentrations below 50 ppb; such guidelines followed the standards set by the Bangladesh government, although the WHO has more stringent standards of 10 ppb for allowable amounts of arsenic in drinking water. Due to the heterogeneous nature of arsenic deposits in the aquifer sediments, and the different rates of release into groundwater, tubewells within close proximity could display very different levels of arsenic contamination in the water pumped out. Thus, safe or unsafe tubewells have to be tested and identified as such.

Although color-coding was supposed to present quick visual markers of safe and unsafe water sources to enable people to identify and obtain safe water, the conflicts over scarce safe water sources (i.e., green-painted tubewells) made social access to safe water a challenge in fulfilling everyday water needs (Sultana 2009b, 2011). Some households benefited from having safe green tubewells, whereas others faced increasing challenges of owning an unsafe red tubewell and having to negotiate their access to safe water (Sultana, 2007b). Mass awareness campaigns attempted to communicate basic information about the sources of arsenic and the contamination of tubewells, as well as the symptoms and causes of arsenicosis, but information alone was insufficient to enable people to switch to safer water sources. Safe alternative water sources that are physically, socially, and financially viable were not available in most places, posing severe constraints on those who knew about arsenic but could not find viable alternatives, as well as exacerbating a particularly gendered burden of fetching safe water because women are tasked with fetching drinking water daily for households (Sultana 2009b). Although many households switched to safe sources as best they could (often by investing in a considerably more expensive, deeper tubewell that accessed the deeper ancient aquifer that was largely free of arsenic), millions of households continued to consume arsenic-laced water because they did not have access to safe water sources or funds to invest in a deeper well. As a result, a public health success story of safe water consumption in the country (with statistics of 97 percent of the population having access to safe potable water in the late 1990s being heralded by various development institutions and the government) quickly turned into a public health nightmare (where millions of people were identified to be at risk of consuming arsenic-contaminated drinking water). Within a short time, by the early 2000s, increasing numbers of

tubewells were identified as contaminated, and more people were found to be ill with arsenicosis and related health problems. Cancer rates in Bangladesh are expected to rise over time as more patients are identified to have been exposed to chronic arsenic poisoning.

## Producing Contaminated Citizens

Contaminated water's impacts are largely felt in the multiple arenas of health and well-being, social stigma and ostracization, and socioeconomic burdens. The social implications of chronic water poisoning and illness manifest in many aspects of everyday life and livelihood. Although physical illnesses are widely prevalent and documented, this is further compounded by emotional stress and incidences of depression (see also Brinkel, Khan, and Kraemer 2009). The ways that arsenic comes to affect both physical and emotional well-being needs much greater attention from health geographers as well as practitioners in the field, as their focus has primarily been on identifying and addressing bodily symptoms and disease burdens of arsenic poisoning and related complications (e.g., cancer of the kidney, heart, and liver). Although these are critically important, there are complex ways that the well-being of entire families is affected by having arsenicosis patients in the home, as well as from living with fear and uncertainty, dealing with rejection from society, and coping with the multifaceted lived experiences of ostracism and stigmatization.

Most of the areas with arsenic contamination have been targeted by development programs that focused on awareness and mitigation endeavors (such as trialing of water filtration systems or community-based water projects), but one aspect that has lagged behind is identification of arsenicosis patients, providing adequate health care, and addressing the social outcomes of arsenicosis for patients, their households, and their communities. There exist significant gaps in the awareness about and understanding of arsenic, its implications and transmission, ways to deal with different symptoms of arsenicosis, and health management options (Mosler, Blochliker, and Inauen 2010). Among rural communities that are grappling with the uncertainties of water poisoning, there appears to be considerable misperception and confusion about what arsenic does, how it affects the body, how it can be treated at different stages, and how to avoid misdiagnosis (Rosenboom 2004). Time is a challenging factor here, as manifestations of arsenicosis can take years, making awareness

campaigns more effective in reducing health impacts if people have been exposed to consuming contaminated water for a shorter time and have alternative safe water sources to which they can switch over. Many people have some general knowledge about skin spots and rashes, as these skin-level symptoms are often most visible in the early onset of poisoning, but most people are generally unaware of or confused about other symptoms (especially those that can lead to various health complications over time). Those who have seen arsenicosis patients or were afflicted themselves are more aware of the health issues involved and more keen about accessing health care (e.g., ameliorative supplements, ointments, medicines, and more aggressive treatment if needed). The prevalence of arsenicosis patients in different areas varies considerably, however, so not everyone in arsenic-affected areas has seen arsenicosis symptoms. Given differences in individual physiologies and exposure levels, there has been a wide variance in arsenicosis occurrence rates across areas with similar levels of arsenic contamination of water and contradictory statistics of morbidity or mortality. To what extent people know exactly in what ways they can help themselves in dealing with the health impacts of arsenic is still debatable. A large proportion of the population rely on information from second- or third-hand sources, with high rates of illiteracy that reduce the effectiveness of written information. There also persist superstitions about the symptoms of arsenicosis (e.g., fear of the condition being contagious). In many cases, the medical costs, especially for people with advanced stages of arsenicosis, are prohibitive for many households, which can also influence patients' abilities to obtain medical assistance in the first place. Furthermore, faith in traditional healers can compound problems when arsenic poisoning goes misdiagnosed or untreated for longer periods of time.

Many people do not think that arsenicosis is a contagious disease or understand that it resulted from drinking contaminated water, and few are knowledgeable about the stages of arsenicosis. Some people perceived arsenic water to be deadly and were more fearful, but there were also skeptical people who did not believe arsenic was a problem, especially if they were drinking water from a contaminated tubewell but had not developed any symptoms yet. Because the predominant way that arsenic has been described in awareness programs in the vernacular is *beesh* (lethal venomous poison), confusion and skepticism arose when no immediate deaths resulted from consuming poisonous water. High levels of variation exist in understanding and acceptance of information on chronic arsenic poisoning.

Those who were more scared were convinced that they should avoid contaminated water, but often this did not stop them from consuming contaminated water if there were no other safe alternatives in their village (Sultana 2006). This creates considerable anxiety and frustration among households who want to obtain safe water but cannot. The sense of despair, grief, and anger in some instances is linked to feeling cheated by development programs that promised safe water but inadvertently ended up poisoning so many people. Thus, poisoned citizens were produced through intersections of geology, development planning, and social realities.

The degree of arsenicosis determines what affect it has on the body and what interventions might be effective. If caught early on, symptoms of arsenicosis can be ameliorated with ceasing further intake of arsenic-laced water (and food) as well as increasing the consumption of nutritional supplements. More advanced cases of poisoning often require aggressive medical treatment to deal with the various health complications. Messages informing people to consume arsenic-free water and more nutritious food to combat arsenic's effects are likely to be useful to those who can afford to do so, however. It is more challenging for poorer households, where individuals are generally malnourished to begin with and have access to even fewer resources for nutritional food or medical treatment. Class is compounded by gender inequalities, where women are often further marginalized in having their health concerns identified, heeded, or addressed. As scholars have widely noted regarding the gender disparity in access to health care globally (Kabeer 1994; Dyck, Lewis, and McLafferty 2001; Curtis 2004), women in rural areas of Bangladesh are less likely to be able to afford and obtain medical attention for health manifestations of arsenic poisoning (Nasreen 2003). Access to adequate health care is a problem throughout rural areas, due to lack of sufficient health care facilities and doctors, as well as the distances and costs involved in accessing health care. This often results in households underplaying illnesses, and often women are denied health care due to their lack of voice, financial resources, or chaperone to accompany them to medical facilities. Many women are also reluctant to be identified as arsenicosis patients and thus become marked socially as someone with arsenicosis, because the stigma of being ill is often a greater emotional stressor. It has been noted by medical fieldworkers that women often cover their bodies even more to hide visible signs of arsenicosis when diagnostic teams come to a village. The overall fear of arsenicosis is explained by not only the bodily health and illness factors but

also from social stigmatization associated with it and the gendered dynamics of stigma, as I discuss in the next section.

## Stigma and Well-Being in Poisoned Waterscapes

Scholars have posited that stigma is a social process that affects not only health but also people's sense of self, well-being, and place (Das 1997). Stigma is faced by individual arsenicosis patients, their families, and even entire areas that have large numbers of arsenic-contaminated tubewells. This is largely due to earlier beliefs that arsenicosis was contagious but also due to opinions that association with ill people is generally a bad idea. Socially constructed norms of who is valued or devalued and stigmatized have thus further complicated the well-being and suffering of people in arsenic-affected areas. Across villages and households, general discomfort exists in associating or socializing with people who have fallen ill with arsenicosis and related medical conditions. General ostracism and marginalization of afflicted families and patients occurs in both subtle and overt ways. People with arsenicosis are often denied work, terminated from their jobs, or treated as social pariahs. Such social outcomes result in exacerbating the general ill-being that people felt from their bodily afflictions and living in contaminated environments. Although most people did not feel that they deserved such treatment (because it was not a contagious illness), the subtle ways that socially constructed notions of acceptance, value, and stigma operate can complicate clear-cut analysis of the situation.

Many people who are afflicted or have arsenicosis victims in their family find that the wider public does not always understand that they are not contagious and that it is difficult to change perceptions. Only the very aware or more educated persons believe that arsenicosis would not be a problem in general socializing, but there is still reluctance by the majority to fraternize with afflicted patients. A substantial minority of the people are openly willing to shun arsenicosis sufferers, highlighting the broader societal problems faced by those living with the condition. This reflects that there are awareness and acceptance gaps in rural societies where arsenic is acute. Overall, both men and women agree that social acceptance and integration are major issues for arsenicosis victims in their community, but there is greater reluctance to associate with a female arsenicosis patient than a male one, as ill women are often shunned in

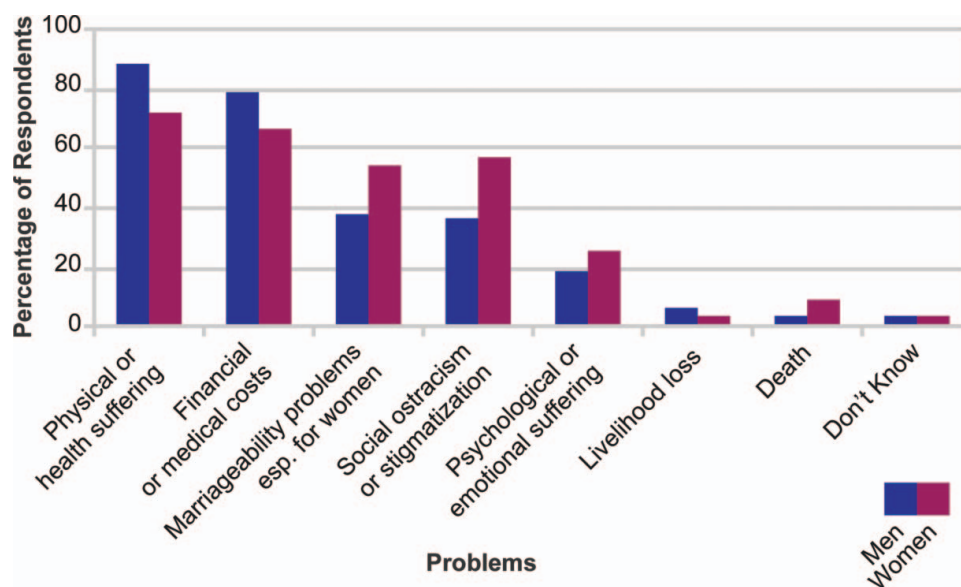


Figure 1. Perceptions of problems facing arsenicosis patients. Source of data: Author. (Color figure available online.)

general. There is a general sense that women are agents of bad luck, and an ill one would be a curse to the family. Although entire households and areas might be stigmatized as outsiders, the situation is particularly difficult for afflicted women and girls in any household.

Figure 1 demonstrates the gender differences in the perceptions about arsenicosis and the problems faced by afflicted people in a survey of 232 people across eighteen villages.<sup>1</sup> Both men and women identified that physical and bodily health suffering was the primary problem. This was followed by financial costs incurred from both medical expenses and costs of trying to obtain safe water (whether purchasing a deeper tubewell or cost-sharing in a water project; see Sultana 2009a). A higher percentage of men, compared to women, identified these two issues as the top two critical problems. The next two items are largely social (social stigmatization and marriageability), where higher percentages of women compared to men deemed the issues to be significant. Nearly 53 percent of the women, compared to 34 percent of the men, identified the biggest social problem to be marriageability issues for women and general social ostracism, stigmatization, and rejection of ill women. Many mothers were worried about the prospect of not finding husbands for their daughters, and younger women were worried about whether they would be valued or desired as wives if they were showing symptoms of arsenicosis. The psychological stress and emotional angst experienced by women who were already ill were followed by the anxiety felt by those who were not ill yet but concerned about what would happen in the fu-

ture. The superstitions that prevailed about arsenicosis, and the stigma against people who were ill, had resulted in divorces, abandonments, and spinsterhood for many women. Although some men felt social stigma as well, it was predominantly women who experienced it disproportionately and were increasingly concerned about it. The complex intersections of stigma, well-being, and social relations are thus evident.

In terms of how the situation played out across socioeconomic class categories, the nature of the problem is starker. The relational nature of class means that the relations that reproduce inequalities also maintain class differences and poverty. In such relations, it is seen that water and arsenic have come to play an important role in the ways that people are variously marginalized or impoverished. One of the most noticeable outcomes of arsenic poisoning has been the ways that ill health and subsequent treatment costs have dramatically affected those with uncertain or limited access to medical resources. It has also resulted in the loss of livelihood from inability to work, as well as from ostracism and stigmatization that resulted in difficulty in finding employment or keeping existing jobs. The less common pathway that impoverishment had come to affect households is from arsenicosis deaths, especially among earning members of the household. Social implications of arsenicosis manifested across a range of issues that iteratively combined to produce illness and ill-being. As a result, the outcomes of arsenic poisoning affected multiple arenas of everyday life and jeopardized the well-being of individuals, households, and entire communities, where

a hazardous environment interacted with society in producing differentiated levels of risk, contaminated bodies, and opportunities to be healthy.

## Conclusion

Health and well-being in developing contexts are imbricated with a host of issues, but a nature–society geography approach highlights complex interactions of ecological and geological systems with social systems. Feminist geography insights, as well as those from critical geographies of health, further illuminate the ways that health, well-being, stigma, and illness are lived and experienced by gendered bodies and communities in hazardous environments. As demonstrated in this article, the ways that people cope with and respond to environmental risks such as water poisoning are complicated by broader social processes, histories, and policies of development interventions, which are further compounded by gender and class differentiations and environmental heterogeneity in the groundwater and local geology that produced an acute but uneven crisis. Geological factors, social processes, and power relations in uneven hazardscapes thus intersected to produce contaminated citizens. These intersections of social dimensions of environmental risks, development processes, and nature further underscore the complexities involved in assessing well-being and health in a developing context. By engaging insights from nature–society geographies of health and feminist geographies of well-being in contributing to existing scholarship in geographies of health, the article highlighted that the experiences of health and well-being are complex and evolving in instances where slow poisoning is simultaneously an outcome of development endeavors and environmental factors and that attention to complex socioecological relations is vital to explanations of well-being and health.

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## Note

1. Lack of space prevents me from elaborating on the details of the study, but further information is available in Sultana (2007a).

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