An Interdisciplinary Approach to Disaster Management, Incorporating Economics and Social Psychology

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Abstract: Following the development of general interdisciplinary approaches to identified phenomena in a range of areas, this paper contributes to the debate over the means of generating knowledge in relation to disaster management. At the core of the disaster management literature is an advocacy for policy and practice which has been grounded in technological, mechanistic and structured systems where military and government-derived institutional models predominate. Recently, this approach has been challenged in the social sciences domain, particularly by sociologists and psychologists, who are developing more critical, interpretive and integrative approaches (e.g. involving social capital and community competence). Thus, surrounding the core literature there is a growing body of contextual work which interacts with the core and is best derived from the utilisation and integration of a range of established social science disciplines. We therefore argue that disaster management is best served by interdisciplinary approaches which not only enhance the development of disaster management knowledge, but also permit a transfer of knowledge from the context into the core so that policy and practice is developed for the purposes of prevention, preparedness, management and recovery phases of disasters.

Keywords: Disaster Management Knowledge, Interdisciplinary Analysis, Community Psychology, Knowledge Transfer, Policy and Practice, Economics

Introduction

THE DEVELOPMENT OF interdisciplinary approaches to research has proceeded, in part, as a result of the recognition of phenomena which are not viewed as coming within the scope of one traditional social science discipline. The purpose of this article is to explore the application of the established social science disciplines to disaster management knowledge-building and to suggest the direction that that approach should now take.

Although social science disciplines have themselves become diverse, they have retained a foundation discipline around which new knowledge is built (e.g. industrial sociology, community psychology, sports history, labour economics). By contrast, some phenomena have been approached on the basis of having observed dimensions, factors and narratives which suggest that several disciplines are better suited to exploring explanations, guiding research methodology and developing new knowledge about them. Research subject to this approach has been driven by the fact that the phenomena with which the research deals are

considered to be significant problems, intractable to the policy solutions emanating from a single discipline (e.g. crime, industrial strikes, incompetent management, concentrated economic power and public health). However, historically, the emergence of approaches within and between disciplines, contested as they became, led to theoretical fragmentation. While it has been recognised that some aspects of life are likely to be more understood through more than one lens, because they are perceived to contain a diversity of elements such that several sciences rather than one provide the capability of explanation and addressing problems, devising theories and methodologies which are drawn from several disciplines has made coordination and integration difficult. Multidisciplinary approaches tended to divide phenomena into discreet disciplinary parts and competing theories. Interdisciplinary approaches in some newer disciplines (e.g. industrial relations) sought to develop their own methodologies by selectively borrowing those of established disciplines. However, the challenge of adequate and relevant integration remains.

It is our contention that the building of disaster management knowledge has taken a similar path.

Background

There is no question that disasters, and therefore disaster management, are an issue. Natural disasters constitute a clear problem for all societies in terms of loss of life, human suffering, political instability and economic cost. Kahn (2006, p. 283) estimates that between 1900 and 2002, there were 4,300 natural disasters in which 815,077 people were killed. This varies significantly over time and between countries. Goklany (2007. p. 5) estimates that deaths per year between 1900 and 1989 averaged 216,839, but declined between 1990 and 2006 to an average of 28,266. Some years result in more destruction than others, for example, one estimate puts the average death rate per year between 2000 and 2006 at 66,812. In 2008, 236,000 died and 211,628,186 'were affected' (Global Education). In addition, there is a distribution on the basis of wealth in which developing countries experience higher rates of death than do developed countries (Kahn 2006; Global Education). Disaster type varies over time and space, for example, deaths from hurricanes in the US between 1903 and 2006 increased on a death per annum basis. However, the unit of measurement can change the trajectory, for example in the above US hurricane case, deaths per annum per million people over the same period declined (Goklany 2007, p. 10). Using insurance industry estimates, Crompton and McAneney (2008) state that the cost of natural disasters is increasing. In Australia, the cost is significant at approximately $A1billion per annum. The Australian Bureau of Statistics (ABS), using other sources states that natural disasters cost Australia an annual average of $A1.14billion, but individual disasters can significantly increase or decrease the cost [e.g. the Newcastle earthquake was estimated at $A4.5billion ABS (2008)].

We concur that it is possible to draw on existing approaches to interdisciplinary studies to enhance disaster management knowledge. However, we argue that what the disaster management literature to date reveals is the identification of elements housed within the established disciplines, but with insufficient connection between them.

Some of the literature has argued for, or assumed that, disaster management is interdisciplinary, at least in terms of research methodology [Shaw and Krishnamurthy 2009(a); McEntire 2007] and that integration between disciplines is apparent (McEntire and Smith 2007). There are good reasons for believing that disaster management lends itself to interdisciplinary ap-

proaches. First, the functions that have been identified as critical to the practice of disaster management: prevention, preparation, response and recovery which themselves are component parts of a process (see below) require structures, systems and processes which have historically been analysed by utilising the social sciences (e.g. the establishment and continuation of disaster management agencies requires political decision-making, economic decisions to provide funding from the public purse and financial systems for payments and control and audit of them, the espoused cultures of the agencies which reflect and provide the basis for authority of operations of the agencies and provisions for psychological diagnosis and treatment of the mental health problems which appear as a consequence of disasters).

Second, the agencies constitute parts of an institutional edifice that house the assigned functions which reveal a division of function resulting in a degree of specialisation (e.g. fire, defence forces in cases of evacuation by helicopter, government agencies charged with maintaining emergency supplies of food, beds and tents and field medical teams). This involves dimensions including strategic choices [e.g. how to build relationships between agencies (Lindell, et. al. 2007, pp. 60-1; Gissing, et. al. 2010)]. Given that these are organisations and simultaneously workplaces, they become subject to the established interdisciplinary approaches to organisational analysis.

Third, the necessity for cooperation and coordination of systems and processes in practice between agencies involves not only inter-organisational analysis, including wider conceptualisation as political systems and as markets (e.g. insurance), but also as sets of interrelationships between groups and individuals in unstructured and informal forms.

Fourth, disasters tend to bring in parts of societies that are usually removed from disaster management (e.g. media organisations and self-identifying volunteers) (Lindell, et. al. 2007, p. 66). This alters the boundaries of disaster management, albeit on a temporary and indeterminate basis. However, in doing so, disasters raise the prospect of the need to analyse an anomalous dimension of societies. This in itself has, as the literature clearly demonstrates, opened the door to alternative approaches which are drawn from several disciplines and are contested within and between disciplines, particularly in the application of risk (e.g. Cannon 2000; Bankoff 2004). However, as we will demonstrate, integration is lacking.

Disaster Management: Core and Context

The core of disaster management at one level is a collection of structures, systems and processes that are technical, functional and rational with the key objective of minimising damage in all its forms from disasters, both natural and man-made. At another level, the stimulus and power comes from what might be called policy, but which incorporates a decision-making organisational and inter-organisational web of institutional and neo-institutional elements which in essence set the scene for influencing disaster management. Overall, this core resides in the public sector and depends for its authority on the state and its constituent parts, but it also incorporates parts of the private sector (e.g. insurance companies) and volunteers as members of the public disaster management organisations. It is at this point that the core has to compromise its power because it has to deal with organisations and people outside its boundaries (e.g. victims of disasters, political institutions and the media). Beyond the principle public disaster management organisations there is a context which influences it and which it influences.

The literature has tended to emphasise the core and only more recently its context. It is in the context that there is to be found the array of theoretical and methodological building blocks derived from social science disciplines which are being used to develop disaster management knowledge as an interdisciplinary study. These are primarily sociology, psychology, politics, economics and management (although we would not want to limit the applicability of any discipline). It is significant that those concerned with the development of disaster management knowledge have adopted knowledge, (including observations, theories and concepts and principles derived from empirical research) from the social sciences and applied it to the analysis of disaster management. More than any other single change in the study of disaster management in recent years, this has generated substantially different approaches and has moved it from a set of taken-for granted assumptions, concepts and theoretical approaches as the basis for analysis into the realm of critical evaluation. In doing so, it is challenging the foundations of disaster management policy and practice.

The Process of Disaster Management

Usually located within the core, the relevant literature has tended to focus on disaster management as a process. Disaster management seeks to pursue its principle function of risk and damage minimisation by control over four dimensions of disasters: prevention, preparation, management and recovery. To some extent these are seen as phases in most disasters. In practice, prevention is constrained by the natural force of each disaster, in other words, short of diverting the river and chopping down the forest, prevention cannot be effectively achieved. This leaves an acceptance of the inevitability of disasters and consequently the process as: making preparations prior (e.g. building levees), managing (e.g. organising evacuation) and recovery (e.g. returning people to their homes). Most recovery (e.g. reconstructing and repairing private buildings and public infrastructure) is conducted outside disaster management. In other words, the capacity to build new knowledge in disaster management is circumscribed by its context, yet influenced by it.

A key question for building knowledge in disaster management is how to integrate the most relevant disciplines. Within a process, disciplines can be used identify and analyse dimensions within the process which are grounded in distinct disciplines and operate concurrently (e.g. economic, social and psychological dimensions of conflict between people which can become apparent when there are attempts to escalate or resolve the conflict). Alternatively, disciplines can operate consecutively, that is as different phases of a process, and may be used to 'track' the process. In other words, there is the identification of one discipline for each phase of a process–leaving aside the further potential for contested approaches within each discipline–which tends to house the dominant perspective for a time until challenged by other disciplines.

An example of this is bushfire (sometimes referred to as forest fires). First, some fire-fighting organisations lobby governments for funding, something to which politics has become applicable. Second, there is an economic question in terms of the allocation of funding to different types of resources (e.g. employing and training fire-fighters as opposed to the purchase of fire-fighting equipment). Third, as some of the literature suggests, there is a question as to the application of resources in efficient/inefficient and effective/ineffective ways because of decisions based on industry traditions and occupational identity.

However, to date, the disaster management literature is exploring the role of disciplines in developing explanations and clearly is following a trajectory similar to that found in other 'new disciplines' in which explanations from individual disciplines have led to contested theoretical approaches. Disaster management is in the early stages of theory-building where testing propositions through research is itself in its infancy. It is reasonable to search for connections between disciplines rather than having a set of established 'founding father' classical platforms. One approach is to begin with identified phases of disasters and test theories and concepts within them, thereby drawing from established disciplines for their explanatory value and potential for application to disaster management policies, systems and practices.

Risk, Social Capital and Cost

Based on the present literature, it is possible to identify three avenues for research and theory-building: risk society, social capital and its link to community psychology and the economics of disaster. These sometimes appear together in one or more of the three phases of disasters and at present are utilised to guide research and theory-building. At this point, it is clear that we cannot definitively assign these streams of literature to established social science disciplines because the boundaries have become blurred.

Risk Society and Disaster Management

In recent years, sociology has moved away from modernist approaches and towards reflexive and postmodern approaches. Beck et. al. (2003) outlines the principle features of modern and reflexive or second modern societies. Within such a general sociological theoretical trend and relevant to disaster management, Beck (1992) analyses a shift away from an orthodox rationale of the production of goods and services and towards a risk society in which the emphasis of societies becomes located in avoidance of and protection from risk. Such changes in sociology identify the traditional value of sociology as a discipline in attempting to found 'grand' approaches as a starting point for explaining social change and enticing other disciplines to develop from these or utilise the ideas for their own single disciplinary theoretical purposes. Beck (2000) argues that we have entered 'an age of culturally-defined risks' which raises questions as to who has the legitimate right to make decisions (e.g. in disaster management terms, whether a state authority should be permitted to instruct people to leave their homes during a time of fire threat). To the extent that risk society is characterised by increasing uncertainty, 'believed risks' become a key source of decision-making. Such circumstances place pressure upon existing institutions and the authority with which they have been invested to change. Of significance for disaster management, such a proposition places disaster management organisations in the core and governments which support, authorise and hold them responsible is at odds with their established structures, systems, cultures and practices. This is because, they were established, and tend to operate on, a basis which is more representative of modernist assumptions and particularly the elements of Weber's ideal type bureaucracy. Some of this sociological work is being applied to disaster management (e.g. Cannon 2000; Williams 2008).

Paradoxically, as some aspects of human life (military, social, economic and health) have become less risky, others have become increasingly risky. To some extent, changes within

developed societies replace some risks (e.g. childhood diseases) with others (e.g. road traffic accidents). There have emerged a wider set of questions which relate to perceptions of risk and consequential reactions to it (e.g. terrorism relative to other threats to life). Perception and attitudes raise potentially interdisciplinary approaches (e.g. psychology and sociology applied to marketing campaigns about safety and preparing for floods and fires).

The significance of this literature is that it generates possible avenues for further theory-building and research within, but not limited to, the range of different approaches to disaster management which have different disciplinary starting points but are also evidence of explorations in crossing disciplinary boundaries.

Social Capital and Community Psychology

Given concerns as to the decline of modernist society, the rise of social capital as a theoretical stream within sociology following Putnum (2000) has come to be used to reinforce disaster management (Osti, et. al. 2008; Zakour 2008). Social capital involves a value being placed upon trust, cooperation and cohesion. These features are built over time and tend to take informal, participatory and network-based forms. While it is assumed that there are benefits to having such a collective approach, there can be 'bad' social capital where organisations can develop authoritarian decision-making forms, exclusionary practices (e.g. sexist and racist culture) and illegitimate objectives and behaviour (e.g. organised crime). Clearly, social capital is being seen as offering solutions to social problems by governments (e.g. ABS 2002).

As extensive, developed and relevant as it is to disaster management (Ritchie and Gill 2007), one implication for developing interdisciplinary approaches is to explore the potential in conjunction with community psychology which fosters the 'sense of community', an intense shared emotional force that enriches both personal and collective well being (McMillan & Chavis, 1986). With an emphasis on developing community competencies, solving problems threatening individual and collective well-being and building social connections (APS, Community Psychology), this branch of psychology overlaps with sociology, particularly where social capital is an element of analysis and practice (Norris et. al., 2008). Recent approaches in community psychology essentially integrate aspects of economic development, social capital, information sources and communication, and community competence and efficacy as practical adaptive strategy for disaster preparedness (Norris et. al., 2008). There have been relevant approaches to disaster management research which provide a basis for interdisciplinary research (e.g. Reser and Morrissey, 2009) and practical applications in preparation and recovery phases of bushfires in Australia (APS, Bushfire Psychological Preparedness and Recovery: Resources for Community). The literature also displays psychological theory-building in preparation phases (Paton, Smith and Johnston, 2005) and research into cross-cultural applications in recovery phases (e.g. trauma-counselling).

The Economics of Disaster Management

There is some evidence indicating that disaster costs are increasing [e.g. where population increases are in high-risk areas (Clower 2007, p. 247)]. Three questions, at least, would seem to lend themselves to the application of economics to disaster management. First, decisions have to be made as to the provision of public goods by government, in short which aspects

of disaster management are to be located in the public sector as opposed to the private. The former interacts with political ideologies and subsequent systems and the latter is subject to the operation of markets. The significance of these decisions is to be found in who pays (the public at large or individuals) and how payment is to be raised (e.g. general or specific systems of taxation or 'user pays' systems). This is a significant aspect because it impacts the direction of subsequent decisions other decisions often flow from such decisions. It is reasonable to assume that in western industrialised economies, preparation and management during and in recovery from a disaster, are the legitimate and expected functions of government, that is to say that government's role is the protection of the citizens from disasters as it is from enemies in time of war. However, not all organisation relating to disasters and payment for all three phases has and is always is the hands of government (e.g. in Australia, fire-fighting services have been traditionally subsidised by the insurance industry and in most economies, while the overarching organisation is often established by and/or maintained by government, much of the labour is provided by individual volunteers). It is also apparent that the third sector, in the form of local, national, and international, non-government organisations (NGOs) play an extensive role in all three phases, but particularly recovery. That said, there is an alternative underlying market view of disasters, particularly in relation to market decisions (e.g. where to build, assessing the costs and benefits of investment and the implications for insurance). Under this approach, the role of government may be limited to providing inform-ation and co-ordinating decisions on flood mitigation investment projects as opposed to providing subsidies on efficiency and equity grounds (Freebairn 2006).

Second, and related to the first question, much of the literature, either implicitly or expli-citly, has dealt with the distribution wealth and income. The work by Kahn (2006) who contrasts disasters and their consequences in rich and poor countries, points out the correlation between wealth and death levels. That rich countries have lower death levels is in part attrib-utable to the development of institutions which tend to protect people from disasters. It is reasonable to add that higher levels of economic growth over time provide the funding base, regardless of sector, for disaster management.

Third, some disasters can be partially or totally the subject of compensation through insur-ance (e.g. Basburg 2009, pp. 193-7). However, the access to this and difference in premiums is distributed in ways which are related to income distribution. The access and cost is also related to the type of disaster. In the case of fire, private insurance is more likely to be widespread whereas in the case of flood it is more likely to be distributed on the basis of location. Despite a history of disasters, private flood insurance continues to be primarily dependent upon location (see Crichton, D. 2005; Insurance Council of Australia) and may be related to relatively high rates of uninsured property, although some studies suggest a wide range of uninsured property (e.g. 6-50% in some US studies, see Pielke 2000, p. 148). It is not clear to what extent governments provide comprehensive compensation in the event of uninsured property being destroyed or damaged. However, again this a distribution question because there is variation of household and business property insurance coverage where countries are categorised on the basis of income, in one estimate from low income with 1% to high income with 30% coverage (de la Fuente 2007).

Theoretical Foundation: Integration or Contested Approaches?

In pursuing a broad approach, disaster management is tending to 'borrow' from established social science disciplines in establishing what elements constitute a core of disaster management knowledge. First, there are a collection of disaster management organisations which are different from many other types of organisations in terms of their key role or raison d'etre. They are designed to combat natural disasters and protect people from the risk of destruction of life, injury and private and public property. As such, they theoretically, at least, have structures, processes, strategies and cultures which differ from those of other organisations. Where there is proximity in terms of role, there is a resonance with organisations which themselves have specialised roles in society (e.g. armed forces and police). This raises a series of theoretical and empirical questions regarding the extent to which disaster management organisations, individually and collectively, can draw upon wider organisational analysis in their interdisciplinary theoretical formulations and how they are influenced by, and influence, organisational analysis. The presumption of legitimacy and authority emanating from any state, namely the protection of its citizenry from threat to life, is a key theoretical foundation stone.

Second, the particular forms which the disaster management process takes are bound to the distinctiveness of natural disasters even though types of disasters (fire, flood, earthquake and storm) suggest different manifestations within the process (e.g. knowledge, skill sets and skill mix, extent of dependence on other types of organisations and attitudes to different communities). However, the process itself, in both theory and practice, implies a set of assumptions about disasters which distinguish it from other socially organised and constructed dimensions of human activity.

Third, the inevitability of natural disasters and their dimensions (e.g. the intensity of a storm, location of a fire, timing of an earthquake) constitute uncertainty accompanied by the most severe risks. This element means that more than any other aspect of human life and organisation natural disasters are the least able to be controlled by human organisation. This all suggests a prima face case for theoretical approaches where similarities, but particularly differences, with other dimensions of society need to be incorporated into theory-building.

Because of the assumption within this approach of the value in developing theory and pursuing research in this area being connected to policy, systems and practice within the core, it is argued that there is a distinction between the development of theory for the purpose of explanation regardless of application in any form on the one hand, and the translation of theoretical development and research outcomes into practice at the end of any process on the other. It is anticipated that the literature to date which, explicitly or implicitly, makes such a broad theory versus practice distinction, will continue. As argued further, one objective of theory-building is to transfer what has the potential to be useful in the quest for the mitigation of destruction into practice. These core elements may change over time, however, to do so would indicate that the discipline itself and the phenomena upon which it has been based to initiate and develop theory, have themselves changed in some fundamental way.

While there is growing acceptance of the role for a broad interdisciplinary approach to disaster management, to date this has been at a general level and applied to research projects with a tendency to assume a specialised role for each discipline. The notion of a core and a context and also of viewing disaster management as a process which is imposed on it by practice, developing theory has been associated with contested approaches. At present two

broad approaches are discernable. In general terms, this has been a divided focus on core and context, and in particular, the influence of social science at large emerging out of the context and interrogating the core.

First, and the orthodox starting point continues to be the core, which is variously described as being necessitated or captured by an engineering, militaristic and bureaucratic view of the world, which for the sake of simplicity may be referred to as 'the technocratic approach' (Hewitt 1983). Here, the reality of disasters determines all that follows in terms of management of them. The central objective is to identify and apply the most effective and efficient apparatus to address disasters. In practice, this appears as a highly rational, functional, structured and systematic apparatus which is as comprehensive as possible. Shaw and Krishnamurthy [2009(b), p. vii] state that 'in most countries the key emphasis has been in the engineering field'.

Second, in what might be called 'a socially-constructed' approach, the work of Beck (1994) in particular, and a number of others (e.g. Perry & Quarantelli 2005; Wisner et. al., 2004; Mileti 1999), in particular, illuminates the emergence of risk society and the wider shift from modern to reflexive modern society. It seems that the disaster management literature has now come to a point where it challenges that 'technocratic' orthodoxy because 'risk is not simply a given; it is–at least in part–socially constructed' (Miller 2009, p. 169). In doing so, it has also followed the trajectory of other interdisciplinary studies in moving from a predetermined or assumed stage of grand theory to a series of contested theoretical approaches (Quarantelli 1998). To the extent that theoretical reconciliation prevails, disaster management will not sufficiently provide a strong enough–in explanatory terms–foundation for policy-formulation and organisational forms and systems and practices within them such as to provide useful practical guidance to address disasters and the management of them.

The disaster management literature not only contrasts paradigms in various ways with different characteristics (e.g. 'vulnerability' versus 'resilience', see Phillips, et. al. year, p. 13) but it also influences theoretical approaches to core and context by identifying core with 'the technocratic approach' and context with 'the socially constructed approach'. In addition, the divide has become widened by associating the core with practice and the context with theory. This reveals the limitations of pursuing explanation in theoretical terms. However, that there remain serious problems with the unpredictability of all types of disasters and the manifest inability of populations, governments and institutions to prevent loss of life and property continues to provide impetus for contested approaches. More than any other single dimension of the emergent literature this divide demonstrates the potential for conflict and cooperation to be separated and congealed. In specific disaster management terms, Alexander (2002, pp. 212-3) emphasises the continuing gap between approaches when this involves the distribution and forms of control, particularly between state institutions and communities. In building theory, disaster management has already set itself on a path of attempting to come to terms with bridging the two broad approaches and in doing so exploring the as yet unchartered waters of how theory-building shifts that theoretical foundation. Moving inexorably towards a more solid foundation from which the benefits of explanation, research, policy and practice can be constructed is, at present, problematic.

That said, recent experimentation with blending disciplines may assist bridging divides. Two narrative examples from Australia may serve to illuminate the bridging. First, in the aftermath of the 2009 bushfire in the State of Victoria, in which loss of life and property in several small towns was extensive, a representative from the relevant fire service appeared

on television to inform the public that the institution could not guarantee that life and property could be protected in the future. This implied a shift of at least a proportion of responsibility onto people in communities and away from public institutions. This followed a period of growing ambivalence by fire authorities throughout Australia that they could not be held responsible for issuing advice or directives to people to 'stay' and fight fire or 'go', as in evacuate. Beyond broad lists of 'things to do' to prepare for fire, the approach moved to limiting risk to all, in particular through public education and developing warning systems. In current theoretical terms, this also opened the debate to a wider use of social capital. Second, during the recent floods in the city of Brisbane which damaged houses built in some suburbs adjacent to the Brisbane River, the recovery phase included people from other suburbs appearing with mops and brooms to help people whose homes had been damaged. The Brisbane City Council put in place systems to transport these volunteers from designated bus stops to the flooded suburbs and to return them. In addition, the Council put in place systems to quickly collect and transport the debris from the houses to a network of temporary central collection points from where larger trucks could transfer it to the established Council rubbish 'tips'. In this instance, there was a bridge between an informal emergence of social capital and an institution. While the role of the state and its agencies and social capital have sometimes been viewed as substitutes (Cannon 2000, p. 17), breaking this nexus and developing them as links in a chain may become a source of integration.

New theoretical approaches outside disaster management may be imported and thus shift disaster management theory-building. For example, Taylor-Gooby's (2006) discussion of social policy points to the social and economic changes taking place which are, and are likely to continue, to reduce the capacity of national governments to adequately fund welfare services. Risk assessment and related techniques may be increasingly applied in order to target public expenditure more effectively and efficiently. In various ways, there may well be increased control over those drawing on public funds but also methods extended and devised to shift more responsibility onto individuals and the costs from the public sector to the private (Posser and Peters, 2010).

Conclusion

The development of disaster management knowledge has demonstrated that it is on a path to further interdisciplinary change. There are various approaches from within single disciplines but also attempts, particularly through research, to utilise several disciplines. To a considerable extent, the emergence of the idea of a risk society, the evolution of social capital and community psychology and early explorations of disaster management through the lens of economics, point to a broader disciplinary foundation.

To date, disciplines have been partially integrated and utilised. It would appear, however, that they have predominantly been used in isolation and thus disaster management knowledge has come to resemble a set of silos. In the literature, there is a demonstration of diversity and flexibility of approaches within and between disciplines. This suggests that 'mix and match' interdisciplinary connections are likely to be contingent upon research questions and further steps in theory-building. Whether promising or not, the terrain appears to be one of bottom-up building rather than top-down, yet this whole process continues to be influenced by the legitimate and not-so-legitimate orthodoxies of the established disciplines.

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