RETHINKING FUTURE UK SUPPORT TO POST-DISASTER RECONSTRUCTIONS : MEETING STAKEHOLDER INTERESTS

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Abstract

It is proposed all future post-disaster reconstruction projects attracting UK support must re-align work plans to conform to the economic, social and environmental objectives of the new 2005 UK HM Government Strategy for the delivery of Sustainability, "Securing the Future".

Post-disaster reconstruction projects provide ideal opportunities for affected communities to gain sustainable improvements and thereby generate benefits for stakeholders on a global scale. To achieve this, current reconstruction practices need to be questioned and rethought to ensure that future works conform to long term needs and the priorities of all affected communities. The new approach must demonstrate a shift in conventional policies if the future security of global populations and their environment are to be guaranteed.

This Paper demonstrates the need for practitioners to steer their engineering work initiatives in future post-disaster reconstruction projects on a new course. This will necessitate an acceptance of the development of a completely new supply chain of essential services and resources required in disaster management practices. There is also a need to develop a rich source of practical engineering applications that will dramatically change our current approach to dealing with emergencies and disasters.

Keywords: sustainable; economic; environmental; social; technology.

AN INTRODUCTORY OVERVIEW

The reporting on recent major catastrophes must make uncomfortable reading for all those involved in providing assistance in the event of a disaster. This discomfort is likely to be particularly pronounced for all those in authority, and specifically for all those holding executive responsibilities for the effective management of events that might involve emergencies and related disasters.

The impact of both the Asian Tsunami and the Pakistan Earthquake has once again clearly demonstrated that there is a need for further major changes in how the international community should respond to crises. Given that there appears to be no

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simple answers to these difficult issues at the present time, the UK Government has recently elected to conduct a public consultation exercise in search of new ideas (DFID 2006). The basis of this exercise recognises that current practices lead to inefficient performance as well as unnecessary burdens on developing countries. It is also identified that the way the world works can be inconsistent and unpredictable, whether this involves the prevention of conflict or state failure; or responding to a major natural disaster; or whether rebuilding after a crisis.

This observation does not only apply to major disasters in developing countries. Hurricane Katrina exposed both personal and structural weaknesses in America's government (The Economist 2005). Since Hurricane Katrina, the world's view of America has changed. The most striking revelation was the government's failure to bring a timely response of essential relief to its people at their time of greatest need. Natural disasters on the scale of Katrina inevitably bring chaos and suffering. But if America is to avoid future catastrophes then it needs to learn the right lessons from the debacle that immediately followed this incident. Furthermore, it is equally evident that America does not have clear answers to the decisions required for the reconstruction of New Orleans. The question may appear inappropriate, but how much damage can a big American city suffer before the decision is taken that recovery initiatives should be either limited or even abandoned.

The ability for communities and even modern cities to recover from disaster is well recognised (Vale 2005). This capacity for recovery is conditioned from many dimensions of resilience, covering various intensities of social, economic, environmental and technological strands that all set out to deliver a successful reconstruction for communities confronting disasters. It is recognised that often there are also religious and political dimensions to the resilience required for a successful and timely recovery, but these strands are not so readily quantified.

Both domestic governments and the international community have responsibilities for confronting disaster at the local level. They also have responsibilities for jointly addressing global issues that are becoming a major concern for the future security of the planet (UN 2004). We currently have many organisations operating at local as well as the international level having favourable intentions for addressing issues for the common good, including disasters. So why is there a feeling that the current organisational framework is inadequate for addressing effectively the consequences of disasters? Furthermore, is it reasonable to speculate that any new over-arching organisation could perform any better than the current setup for dealing with disasters? Awareness of key issues and the benefits of change are recognised in terms of new strategic management initiatives (Thompson 1994). It is equally clear the effective management of change (Burnes 2004) necessitates a good understanding of organisational behaviour (Mullins 2005).

The institutional frameworks in which all organisations involved in disasters must operate at a local level are conditioned by political and religious practices and behaviours. Local cultures which impact on practices and behaviours are significantly influenced by social, economic, environmental and technological

strands. Within this context, there may be a strong argument to set up a new internationally recognised organisation with the over-arching authority to lead, manage and coordinate others involved in future major disasters with a view to improved performance. However, before this can happen, agreement must be reached on fundamental questions if such an organisation is to command the authority required for the discharge of all necessary responsibilities. Perhaps only then might it be feasible to avoid the disasters of the scale as the Asian Tsunami, the Pakistan Earthquake, Katrina or others still on the horizon?

It is outside the scope of a short paper such as this to identify an institutional arrangement or organisational solution to this problem, given that the UK Government has turned to a public consultation exercise in search of new ideas on this very matter. Accordingly, this paper only sets out to identify and define the main ingredients required of organisations if there is to be a better understanding of some of the main issues that must be addressed in the future management of disasters. These issues must be agreed if we are to have a future better performance record in dealing effectively with disasters.

THE CURRENT SITUATION IN MEETING STAKEHOLDER INTERESTS

No stakeholders can feel satisfied with the current progress in addressing the needs of the Asian Tsunami, the Pakistan Earthquake or Hurricane Katrina to mention just three recent disasters. Furthermore, the eventual outcomes of these disasters remain uncertain. The count in human tragedies to-date cannot be forgotten, but neither can the needs of all survivors or the future desirable reconstruction efforts be put to one side. Whether rebuilding people's lives; their communities; their jobs; their housing; their supporting basic infrastructure or taking preparedness and mitigation measures to address shortcomings, all these individual provisions require attention from some quarter (Landes 2001).

Each stage in the disaster management cycle applied to specific incidents, whether we are dealing with preparedness, mitigation, response, recovery, reconstruction or development necessitates an input of considerable resources. These resources normally come in the form of finance or equivalent that will be required to mobilise unskilled labour, semi-skilled labour, skilled labour, management, materials, consumables, plant, equipment, vehicles and machinery. The resources required for the effective management of disasters should never be underestimated. Aircraft, helicopters, and essential operational backup do not come cheap and are sometimes scarce, but they are often essential for a timely response in some locations as well as for specific incidents. Of course, equally significant resources are required for all stages in the disaster cycle, and particularly for reconstructions.

It is therefore clear that a better understanding on the resource provision is required if we are to improve the current situation. It is argued that adequate resource provision can be equated to the economics of supply and demand, and in effective disaster management, the role of an efficient supply chain together with robust logistical systems and procedures (Broadbent 1999) are inevitably paramount.

Therefore perhaps we require a deeper comprehension of the role of economics in disaster management if we are to improve the current way things are done.

The role of economics in the shaping of history is very interesting and relevant to disaster management (Backhouse 2002). Backhouse recognises there is some difficulty in defining the precise meaning of economics, and a wide range of definitions are explored. For instance, Backhouse identifies one definition of Lionel Robbins to be: “economics is the science which studies human behaviour as a relationship between ends and scarce means which have alternative uses” whereas Alfred Marshall defined it as “the study of mankind in the ordinary business of life”. Backhouse further identifies that economics “emerged only slowly as a distinct discipline out of theology, moral philosophy, administration and law” and it has been strongly “influenced by the importance of Christianity, Islam, science, and politics”.

It is equally important to recognise the distinct role of economics in contrast to the role for which it is often confused, namely finance and financial markets (Coggan 2002). The discipline of economics has very wide coverage, as it is underpinned by a matrix of political, religious, social, technological and environmental strands. It is therefore understandable why economics should play such a key role in both reconstruction and development initiatives, even though it can have a very frustrating impact when efforts set out to accelerate progress or achieve quick results. Economics applied objectively can lead to the selection of the best of all alternatives given a range of options, and its application can certainly avoid significant waste.

Within the context of our search to seek improvements in the management of emergencies and disasters, we therefore come to recognise the important role of economics when it comes to the management of decision-making processes in the allocation of resources. However, it is equally important we come to accept that there can be no economics in circumstances where there is no limitation in the availability of resources (Turner 1994). We currently have a deep concern on a global basis on the depletion of our natural resource stock and the impact this has on our natural environment. Accordingly, it is very clear we must be transparent and accountable in the manner we use economics for decisions taken in allocating resources for the management of disasters, recognising the limiting constraints of the natural environment in which we all operate (Oldfield 2005). This argument therefore leads to the manner in how we adopt the principles of sustainability in disaster management practices, and whether this is applied to response, recovery and reconstruction. This issue raises questions on how serious sustainability is taken by those who practice the management of emergencies and disasters.

RECENT INCIDENTS AND THE RESPONSES GENERATED

There is a large volume of information available on recent major incidents. This information is not always suitably consolidated and is certainly complex for comprehensive analyses. Within hours of the very recent Asian Tsunami and the Pakistan Earthquake incidents, Oxfam (Eade 1998) was able to mobilise operations at their UK Logistics HQ Warehouse and transport by air the assessed essential

resources required for immediate humanitarian relief, covering water supply and treatment kits, and similar provisions. This form of service can normally be provided very rapidly by Oxfam and similar NGO Organisations to virtually anywhere in the World provided there is a political will and agreement for this. Rapid response may not always be feasible, whether for political reasons or for logistical problems.

However, the nature of response in all these circumstances may not be the most appropriate for either the short or the long term. It is argued in this Paper that all resource provisions should be questioned? For instance, Oxfam do not generally stock tents in their HQ Warehouse, as it is argued emergency shelters should be supplied from local sources. This approach may appear sensible. Local food is treated as a similar commodity. In contrast, water supply kits are generally provided because they set out to secure an essential basic need in emergencies with a view to protecting the health of the most vulnerable. Furthermore, kit alternatives are often difficult to get from the local market. However, the need for tents as the winter months approached was always assessed to be a critical requirement for the Pakistan Earthquake victims. It is certainly considered shelter, water and food are all basic needs of equal importance to people facing the consequences of disaster (Davis 2002). So why has it been so difficult to provide in Pakistan the essential temporary shelters? Could this be a lack of or failure in local preparedness?

The emergency Water Supply Kits provided by many NGOs also deserve a close examination. Storage tanks are normally formed from light corrugated sheets that are assembled and bolted together on site to form structures of circular cylindrical tanks with a capacity between circa $50m^3$ and $100m^3$. The tank water storage is normally facilitated with rubber liners. Within the treatment process, water is distributed in lightweight uPVc or PE pipes, and control is achieved with various forms of valve. Water is distributed by gravity flow where this is feasible, but it will be pumped where site topography is unsuitable or where raw water is to be abstracted from a relatively low level surface source. Pumps are generally centrifugal and are powered by the energy of diesel engines. The engines and pumps would normally be supplied with the kits, together with adequate spares. Accordingly there are many apparent attractive features associated with these kits: they are relatively light and compact to transport; they can be erected rapidly; they are easy to operate and maintain; and many view them to be technologically appropriate. But do they satisfy the best of all options, and by supplying kits, is a precedent set for the future? Furthermore, is this the basis of a sustainable solution? A major issue to assess and evaluate is whether these decisions serve the best interests for the longer term given the difficulty of meeting the demands of global populations with appropriate water supplies and sanitation (Baynard 2005)?

These are very difficult questions to answer with any authority, but they are very important. Indeed, a very comprehensive analysis and evaluation could be undertaken on many recent major disasters to assess in greater detail the economic, social, environmental and technological implications on decisions being taken. Lessons could certainly be drawn from the Pakistan Earthquake, Katrina, the Asian Tsunami, Bam, and many other major recent incidents, but this would be a massive

undertaking. It is perhaps more useful to focus on recent UK issues if it comes to assessments of what future support may be appropriate for incidents abroad.

The UK has seen a rapidly changing scene over recent years in its dealing with emergencies and disasters at home (Abbott 2002). Furthermore, the recent UK Civil Contingencies Legislation (CCL) has had major impacts on those holding responsibilities for dealing with emergencies and disasters (CCS 2004). New disciplines and training continue to emerge to be significant components for those in the public and private sectors coming under the umbrella of these initiatives (Elliott 2002). However, the impact and the integration of all these changes with other developments do not appear to be fully appreciated or understood. This appears to apply particularly to the potential impact of the built on the natural environment, and it is useful for comparative purposes to focus on the water sector in the UK.

The water supply crisis in Yorkshire was a sobering UK experience (Uff 1996). As a consequence of this crisis, the Government, the Water Companies, the Environment Agency (EA) and the general public have become much more aware and concerned with key issues. Indeed, the UK has a current water stress problem in the South East which has yet to be resolved (UK National Statistics 2005), hopefully in good time for the Olympic Games. Surprisingly, and in contrast, the authorities and business are currently considering the construction of a new generation of very tall skyscrapers in the City of London. This appears to run contrary to lessons learnt from 9.11; the current water stress; and many other issues such as the recent fuel storage fires north of London. In parallel with these developments, the UK is faced with requirements to fulfil its obligations in dealing with the threats of flooding, drought and their impact on the environment (DEFRA 2004); in the implementation of the Water Framework Directive (WFD) (CIWEM 2005); and a range of other WFD commitments to bring all waters in the UK to a good ecological status. The WFD is to be applied to all surface, ground and coastal waters in the EU.

The UK Severn Trent Water (STW) Company currently holds responsibilities for water supply and sewerage services for circa 7 million customers in the catchment basins of the Rivers Severn and Trent. However, the new CCL has placed additional responsibilities on STW which concerns the planning for emergencies and disasters, and these must be integrated with the extensive obligations of the new WFD. A recent STW key note address (CIWEM 2006) identified for the first time an acknowledgement of the vulnerability of the 1 million people living in Birmingham (UK 2nd City) to the potential loss of Elan Aqueduct. This strategic aqueduct was built in the Victorian Times, and transports essential water some 100 kms overland from the catchments in Central Wales to the City of Birmingham. Over recent months, the Elan Aqueduct has indicated a local but significant natural deterioration, and the security of supplies has been seriously questioned. To address this development, STW undertook certain actions which involved:

- closing the Elan Aqueduct for up to 2 weeks to facilitate repairs
- taking water from other sources to supplement supplies
- imposing demand management regimes as resources were inadequate

- encountering problems in mixing waters as public quality concern
- on reopening of Aqueduct, the repairs were found to be ineffective

These difficult emergency operations therefore failed to deliver the intended outcome and it will be necessary for STW to return to the work for a second attempt if a potentially serious situation involving the complete failure of water supplies is to be avoided in the future. However, other alternative options are being investigated, but the additional findings so far indicate that:

- in the West Midlands, the maximum sized community that can be effectively served in an emergency using a bottled water supply distribution method is a 20,000 population. In this assessment and evaluation, logistical constraints have proved to be a key issue.
- a major concern for STW in the search of all alternative options is the current energy costs which over recent months have escalated alarmingly. The security of future energy supplies and their costs for the current setup at STW are now a major concern in respect even to all normal operations.

This simple UK case study for a strategic basic need in the water sector identifies that a serious problem has yet to be resolved. In situations such as this, management must undertake a comprehensive risk assessment of the situation and evaluate the best of the alternatives (Loosemore 2006) to ensure the future is secured in conformity with the UK Government Strategy (HM Government 2005). Taking lessons learnt from this exercise on a wider scale, as well as addressing the UK commitments for Eliminating World Poverty (DfID 1997, 2000 and 2006), it is clear that there is a need to seriously question the manner in which we conduct the management of emergencies and disasters, whether this is in the UK or elsewhere.

UK SUSTAINABLE DEVELOPMENT (SD) : " SECURING THE FUTURE "

The new UK Government Sustainable Development SD Strategy, "Securing the Future", builds on other recent work (HM Government 2005). This strategy sets the scene on how the UK intends to deliver sustainability and thereby secure a future for civilisation as we know it. Since the consequences of either the success or the failure of this strategy are fundamental to the people of UK, then it is reasonable to propose that the intentions of the strategy should be applied as a blanket to all UK operations, whether locally or globally.

There is therefore a very strong argument that the Strategy should be applied to all disaster management activities. Indeed, it should be recognised that any disaster provides an ideal opportunity to introduce timely and practical solutions based on the benefits of the very latest thinking, and solutions that avoid the mistakes of the past. Furthermore, given the Strategy is to be applied within the UK, then why not to any proposed future support to worthy post-disaster reconstruction efforts wherever they might be. This approach would then be consistent to all stakeholders, whether they are in the UK or abroad. The Strategy therefore warrants a close examination if it is

to be applied to post-disaster reconstruction and if we are to assess whether the adoption of the Strategy is an appropriate umbrella for disaster decision making.

It is stated that the SD Strategy "aims to enable all people throughout the world to satisfy their basic needs and enjoy a better quality of life without compromising the quality of life of future generations". The new 2005 SD Strategy builds on the 1999 four central aims of sustainability, but significantly, it is seen that equal weight should now be given to each, namely:

- social progress which recognises the needs of everyone
- effective protection of the environment
- prudent use of natural resources, and
- maintenance of high and stable levels of economic growth and employment

An additional important provision of the UK SD Strategy is the recognition of the clear obligation on more prosperous nations both to put their own house in order, and to support other countries in the transition towards a more equitable and sustainable world. Accordingly, the strategy has a focus on long-term solutions, not short-term fixes, and it is seen as a catalyst for action to secure our future. It is worthy of mention here that a common criticism of many practices in disaster management, particular in emergency response, is they often have a focus on short-term fixes rather than the most appropriate solutions.

The UK SD guiding principles to be used to achieve the aims of sustainable development are based on living within environmental limits and a just society, and this is to be delivered by means of sound science, sustainable economy and good governance. These consolidated principles sit comfortably with the four aims, and they set out to share an approach that provide for :

- respecting the limits of the planet's environment, resources and biodiversity.
- meeting the diverse needs of all people; promoting personal wellbeing, social cohesion and inclusion; and creating equal opportunity for all.
- ensuring policy is developed and implemented on the basis of strong scientific evidence, taking account scientific uncertainty, public attitudes and values.
- building a strong, stable and sustainable economy which provides prosperity and opportunities for all, and which environmental and social costs fall on those who impose them, with incentives awarded for efficient resource use.
- actively promoting participative systems of governance in all levels of society.

All these principles sit comfortably with good disaster management practices. Moreover, the priority areas identified under the SD Strategy for immediate action across the UK are equally relevant and have been identified to be :

- securing a profound change in the way energy is generated and used, whilst preparing for climate change that cannot now be avoided.
- identifying enhancements and recovery of degraded environments, to ensure a decent environment for everyone.
- addressing how to achieve more with less, covering how goods and services are produced, and then consumed, and the impacts of products and materials

across their whole lifecycle. This includes the inefficient use of resources, and breaking the link between economic growth and environmental degradation.
- working to give communities more say and power in the decisions that affect them, and in partnership to get things done. It is intended the UK adopts this approach in overseas aid programmes in order to tackle poverty and environmental degradation where good governance is being sought.

For overseas aid, the UK's approach to global development over recent years has been framed to a range of international commitments, such as to the Millennium Development Goals (MDGs) and the European Union's Sustainable Development Strategy (EU SDS). It is stated in the UK SD Strategy that the goal for international sustainable development is to support multilateral and national institutions through commitments such as the MDGs and the EU SDS to ensure effective integration of social, environmental and economic objectives to deliver sustainable development, especially for the poorest members of society. Accordingly, all these goals have one focus on poverty and the vulnerable poor, which are a major concern to the practice of effective disaster management (Blaikie 2000).

But it is recognised that the goals presented here will be meaningless unless progress is made in achieving each of the specified objectives, and that progress achievements are carefully monitored and evaluated. The UK Government has therefore introduced a new set of high-level indicators that are robust and meaningful; are linked and agreed; provide UK coverage; indicate trends and highlight challenges, to give an overview of sustainable development. An undertaking has been made to assess and report annually on the progress in SD against the indicators (UK National Statistics 2005). These indicator assessments will be used to determine the success in attaining the goals or whether different policies and actions are required. It is also intended to explore the feasibility of using the indicators to measure UK impacts overseas.

FUTURE DISASTERS : NEW OPPORTUNITIES FOR SUSTAINABIITY?

The implementation of the UK SD Strategy provides key management opportunities in arguing for support in dealing with the needs of future disasters provided that, where initiatives are taken, they are seen to be clearly based on the social, economic, environmental and technological strands that all underpin sustainability.

Firstly, major behavioural changes will be needed to deliver sustainable development. These are social issues in which the role of education aids could be used to raise awareness, thereby developing new skills and knowledge to forge good habits in preparation for when individuals take up their role as members of active communities. It is generally accepted that people are prepared to act and change behaviour when working in groups at a community level provided there is a catalyst to enable and encourage people to engage with the key issues. This could involve developing community energy and transport projects; assisting in tackling climate change; economising water use; helping to minimise waste; promoting fair

trade; mobilising sustainable consumption and production; and improving the quality of the local environment. It could involve building up resilience to deal with disasters.

Secondly, the environmental impacts from consumption and production patterns remains very severe, and inefficient use of resources is now becoming a drag on the global economy and business. Increasing prosperities across the world have allowed many people to enjoy the benefits of goods and services which were once available to just a few. However, current developed country patterns of consumption and production could certainly not be replicated world-wide, and some assessments indicate we would in fact require three planet's worth of resources to achieve this goal. In the past, there has been a focus mainly on pollution from production activities. However, there is now a need to refocus on greater efficiency and value with less resource use, pollution and waste. Business also needs to be encouraged to develop sustainable products, and to promote new design solutions which benefit the environment and the economy. Recycling, re-use or remanufacturing measures should also be promoted to complete the loop in the way resources are used. The current largest and fastest growing pressures on the global environment come from areas such as household energy, water consumption, food consumption, travel and tourism. The world as a whole cannot sustain consumption patterns like those enjoyed by Western Europe, whether this is related to air and vehicle travel; water use; diet; and in the support of the general standard of living. Future production and consumption provisions for the management of disasters should reflect this change.

Thirdly, the greatest threat faced concerns climate change and energy. Projections of future climate change indicate a trend in increases of global average temperatures and consequential changes in the risks of storms, floods, droughts, and heat related deaths. This all leads to greater risks of major disasters. There is a need to make a profound change in energy usage as well as the traditional methods of energy generation which produce greenhouse gas emissions. These emissions need to be significantly controlled and reduced, whether at home; at work; when travelling over land, across water, through the air; or at leisure activities. This action could then beneficially modify the current course of climate change, thereby reducing its impacts on the environment, the economy and society. There is thus a need to promote energy efficiency in homes and businesses; increase the share of electricity generated by renewable resources; encourage the take up of less polluting vehicles; and encourage individuals and communities to reduce detrimental emissions.

Fourthly, natural resources are vital to our existence and to the development of communities throughout the world. However, the demands on natural resources continue to increase at an alarming rate as a consequence of the current consumption patterns of global economic growth. A better understanding of environmental limits is therefore required where natural resources are being or have been severely depleted or degraded. The relationships between a healthy economy and an effective functioning ecosystem must be recognised, given that air, water and soil sustain life and support the biological resources on which all populations depend. A better knowledge is therefore required on the value, resilience and vulnerability of the ecosystem, so that the full benefits and the current pressures on it

are more fully understood. The health of global populations and its wellbeing are inextricably linked to the quality of the air, water, soils and biological resources. Furthermore, the variability of the global biological resources provides the umbrella for the biodiversity in plants, animals and other organisms to maintain the life-sustaining systems of the planet. To accommodate all these demands, sufficient allocated space is required both for the natural environment processes to function in a healthy state, whether in the oceans, across continents or within the forests, as well as for civilisation to harness opportunities for agriculture, industry, cities and supporting infrastructure. A balanced approach in the use of non-renewable resources for the optimum development of renewable energy resources must therefore be aggressively promoted to harness the benefits of wind, tidal, geothermal and solar energy. Disaster management should be fully aware of these key issues.

Finally, it is important all future initiatives are effectively promoted, moving from a local scale and expanding this to global dimensions. Past efforts on a global scale have generally focussed on dealing with the consequences of instability and responding to crises. It is felt more attention in future should focus on building up global capacities and resilience to manage risks and deal with shocks that lead to disasters. Food and water scarcity, changes in land use, natural disasters and environmental migration can all play a part in the escalation of tensions leading to disasters. In these cases, the most vulnerable are the poor, and tacking global poverty remains a priority under the umbrella of the MDGs. Partnerships should be developed to tackle social, economic and environmental issues and inequalities.

Ultimately, it is recognised that all these strategic initiatives have little value unless they can be delivered and turned into action. Domestic Government and the International Institutions are accountable only in part, as each individual in global populations has a responsibility for a successful outcome. This will be achieved when all communities emerge in sustainable forms, and these will be

- active, inclusive and safe, being fair, tolerant and cohesive with a strong local culture and other shared community activities
- well run, with inclusive participation, representation and leadership
- environmentally sensitive and considerate, providing places for people to live
- well designed and built, featuring a quality built and natural environment
- well connected, with good transport services and communications linking people to jobs, schools, health and other services
- thriving, with a flourishing and diverse local economy
- well served, with public, private, community and voluntary services that are appropriate to people's needs and accessible to all, and
- fair for everyone, including those in other communities, now and in the future.

These provisions provide a sustainable framework upon which management can focus in the future, and thereby set about meeting the best interests of all stakeholders when responding to emergencies and disasters. All disaster managers must recognise the time as arrived when there is need for change in the approach to all post-disaster reconstruction initiatives, and all decisions must take account of the

full social, economic, environmental and technological implications. This can then have a major impact on the resources required for any production and consumption processes in many reconstruction activities; in securing construction materials; in transporting people and goods; in providing food and dealing with all wastes.

PLANNING PRACTICAL OPPORTUNITIES FOR FUTURE EVENTS

So what are the practical implications of these new proposals? The changes would certainly bring sustainable benefits over the longer term provided all stakeholders were made aware and agreed to all key issues that were being addressed. Disasters are like a major consumer at the end of a supply chain, and therefore manufacturers and traders associated with key production lines would need to be persuaded on the benefits of these new directions. It is envisaged the largest difficulties could be associated with the launch of the new initiatives, and therefore some simple issues will be examined to demonstrate how key hurdles might be overcome.

Each future emergency or disaster would still be treated as an individual project, and therefore sound management principles should be applied (Alexander 2002). This will entail applying planning and controlling techniques for effective management (Burke 2005) but with a very clear focus on the economic allocation of resources in line with sustainability decision-making. A major first concern of people caught up in catastrophe (Alexander 2000) is often to attend to their basic needs of food, shelter and water prior to attending to more longer term requirements. To deliver all these needs requires an allocation of various resources in a supply chain composed of various inputs of labour, materials, consumables and machinery to provide outputs of transport, consumables, equipment and goods. The best of all alternatives would need to be identified adopting the principles of economics, with a focus on limiting energy provisions, environmental impacts and wastes in line with sustainability.

Accordingly, for shelters, short term measures might identify local tent fabrics to be the best option (Davis 2002) whereas for the longer term, traditional forms of structure (Broadbent 2004) with a mix of appropriate variations (Yahya 2001) using local construction materials (Keefe 2005) and modern principles (Chudley 2004) may be the most appropriate. The use of non-renewable energy resources for transport (Royal Academy 2005) and power generation would be avoided where practical and feasible for both short term and long term requirements. The best of the options for particular circumstances might include rapid introductions of a mix of new renewable energy resources (Twidell 2006) for power generation based on solar, wind, biofuels, biomass, hydro-power, wave, tidal, geothermal or other alternatives, together with a rapid phasing out of any fossil energy-based power generation. Power provisions would come from the same sources for supporting domestic needs, water supply, sanitation, drainage, irrigation, agriculture, infrastructure, and for any other economic development. Post-disaster reconstructions would set out to generate local employment from these works (Broadbent 2003), whilst every effort would be taken to minimise waste as well as avoiding to pollute the environment (Appelo 2005).

CONCLUSIONS

This Paper has demonstrated with some simple supporting illustrations how the UK could jointly support both its strategy for sustainable development as well as serve the interests of disaster victims in post-disaster reconstruction works. Whilst the emphasis here has been only on some feasible changes in resource allocations and related technological issues, the UK support would also set out to underpin the full spectrum of beneficial social, economic and environmental matters relating to all stakeholders interests, whether these be for disaster victims or the wider global community. This approach meets the interests of all present and future stakeholders.

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