Title: Governing epidemics in an age of complexity: Narratives, politics and pathways to sustainability

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More details/abstract: This paper elaborates a 'pathways approach' to addressing the governance challenges posed by the dynamics of complex, coupled, multi-scale systems, while incorporating explicit concern for equity, social justice and the wellbeing of poor and marginalised groups. It illustrates the approach in relation to current policy challenges of dealing with epidemics and so-called 'emerging infectious diseases' such as avian influenza and haemorrhagic fevers, which involve highly dynamic, cross-scale, often-surprising viral–social–political–ecological interactions. Amidst complexity, we show how different actors in the epidemics field produce particular narratives which frame systems and their dynamics in different ways, promote particular goals and values, and justify particular pathways of disease response. These range from 'outbreak narratives' emphasising threat to global populations, to alternative but often marginalised narratives variously emphasising long-term structural, land use and environmental change, local knowledge and livelihood goals. We highlight tendencies – supported by cognitive, institutional and political pressures – for powerful actors and institutions to 'close down' around narratives that emphasise stability, underplaying longer term, less controllable dynamics. Arguing that governance approaches need to 'open up' to embrace strategies for resilience and robustness in relation to epidemics, we outline what some of the routes towards this might involve, and what the resulting governance models might look like. Key are practices and arrangements that involve flexibility, diversity, adaptation, learning and reflexivity, as well as highlighting and supporting alternative pathways within a progressive politics of sustainability.

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Governing epidemics in an age of complexity:

Narratives, politics and pathways to sustainability

1. **Introduction**

   Zimbabwean President Robert Mugabe says that the government has stopped the cholera
   epidemic. His announcement came just hours after South African officials declared that
   extraordinary measures were needed to control the rising number of cases on the border
   between the two countries. The United Nations news service IRIN reports that the
   outbreak – which has now claimed nearly 800 lives – is finding vulnerable targets among
   people living with HIV (News report by Reuters, 12 December 2008,
   http://www.alertnet.org/thenews/newsdesk/LB410869.htm, accessed 13 December 2008)

The interlinkages between dealing with epidemics, and governance, are both deep and

problematic. Responding to an epidemic requires the mobilisation of institutions and power.

Apparently successful responses – a story of an epidemic successfully stamped out – can also

shore up that power, as President Mugabe and his supporters are well aware. Yet what goes on

behind the scenes – or façades – of such powerful storylines can, as this quotation highlights, be

interactions and co-evolutionary dynamics between microbes, biology, ecology, and social,

technological and political change that are left unaddressed. In this example, what is neglected

are interactions between cholera and HIV, and the vulnerability to disease of people and places beset by economic, state and health system collapse.

Spurred by recent experiences with H1N1 or so-called 'swine flu', SARS, HIV/AIDS, Highly Pathogenic Avian Influenza (HPAI), viral haemorrhagic fevers such as Ebola and Marburg, and others, threats of infectious diseases emerging and manifesting themselves as epidemics – or as pandemics of global proportions – now run high amongst policy and public concerns. Like many issues more conventionally considered under the ambit of global environmental change, epidemics highlight starkly the inter-coupled dynamics of social-ecological-technological systems – with ecology here as disease ecology and microbial biology in interaction with wider agronomic and environmental processes. Epidemics implicate a diversity of spatial scales – from the individual diseased body to the globe – as well as temporal ones, as short-term outbreaks interact with longer-term predisposing conditions, stresses and drivers. The dynamic, complex and coupled systems involved with epidemics create a range of novel and pressing governance challenges, which are currently hotly debated (see Dry, 2008). This article aims to contribute to these debates by offering a particular analytical approach – a 'pathways approach' (Leach et al forthcoming) – to addressing epidemics governance. We define 'governance' broadly as political and institutional processes, including those involving knowledge and power. Distancing ourselves from ideologically-loaded definitions which associate governance with neoliberal agendas, governance connotes a move beyond state-centric accounts, to acknowledge the multiple and networked interrelationships between private, public institutions and civil society institutions, across multiple spatial scales (Pierre and Peters 2009; Rhodes 1997; Bache and Flinders, 2004).

Using this pathways approach, and illustrated by empirical examples of responses to haemorrhagic fevers and highly-pathogenic avian influenza (HPAI),[1] we address why certain modes of epidemics governance have become and remain so prominent, suggesting that particular framings of 'the problem' and governance processes and architectures have become mutually supporting and interlocked. Yet we also expose their serious shortcomings with respect both to their ability to deal with the full range of dynamics involved, and their implications for equity and social justice. While the article's primary aim is therefore to offer a novel conceptual framework, secondarily it attempts both an empirically-supported analytic description of certain problems in current health governance, and an explanation of why these problems persist. It also outlines key elements of the new modes of health governance which, we argue, will be needed to build epidemic responses which are sustainable in the face of complex systems dynamics, and which meet the needs and priorities of currently marginalised people.

We proceed as follows. The first section introduces initial building blocks of the pathways approach in terms of an appreciation of complex system dynamics, and a normative concern with poverty and social justice. The next section elaborates how different people and groups understand and 'frame' systems in different ways, such as to produce particular narratives about epidemics that are co-constructed with institutions and politics. We illustrate a broad yet pervasive contrast between 'outbreak narratives', and those recognising less predictable and longer-term social-ecological-viral dynamics, and the ways local people understand and live with these.

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[1] This must necessarily be brief here due to constrained space and the primarily conceptual focus of the article, but see Scoones (forthcoming) and Dry and Leach (forthcoming) for more detailed examples and evidence.

Next the paper considers how such narratives envisage different strategies to deal with dynamics. We suggest that political, institutional and cognitive pressures push powerful actors to 'close down' around strategies emphasising stability in the face of short-term epidemic shocks. The result is pathways of response that occlude attention to vital longer-term, less controllable dynamics, as well as to issues of justice and distribution. We argue that governance approaches need to 'open up' to recognise and support multiple narratives about epidemics and their associated pathways, including those alternative pathways which embrace strategies for resilience and robustness, and which support the perspectives and goals of poorer people living with disease in localised settings.

2. Complex dynamics, social justice

Epidemics and so-called 'emerging infectious diseases' illustrate clearly the rapid, inter-coupled dynamics of social-ecological-technological systems. The intimate relationships between human societies, ecosystems and potential pathogens have, throughout history, given rise to complex challenges to human health. Yet the acceleration of a range of biological, social, ecological and technological processes during the last half-century has contributed to the emergence of new infectious disease challenges – whether the introduction of HIV and new viral haemorrhagic fevers to the ecosystem or the fear of a pandemic of highly pathogenic influenza (Bloom et al 2007). The processes involved include the evolutionary dynamics of pathogens, as viruses and vectors exploit niches that become available through environmental, demographic and livelihood

change. They include interactions between pathogens and technology, for instance as microbes develop resistance to drug treatments. They include demographic change, and rapid growth in the numbers of both humans and domestic animals. Human-animal demography also affects zoonosis, the process whereby disease passes to humans from other species, now widely acknowledged as critical in the emergence and re-emergence of infectious disease. It has been suggested that all new infectious diseases of human beings to emerge in the past 20 years have had an animal source, while Jones et al (2007) find more than 60% of emerging infectious disease events since 1940 to involve zoonoses, 72% of these with wildlife origins.

The impact of population growth interacts with patterns of human and animal population distribution and mobility, and the socio-economic and livelihood factors shaping these. Social and technological changes have increased the volume and speed of travel, providing new mechanisms for the rapid spread of pathogenic organisms and environmental stressors. Thus with more than two billion air journeys a year globally, the isolation of a disease outbreak becomes an increasingly formidable task. In some countries internal rural-urban migration is equally important. Some argue that rapid population growth in urban centres, especially in less developed economies, has resulted in overcrowded accommodation and highly congested transport systems which, combined with inadequate water and sanitation services, provide greatly increased opportunities for person to person disease transmission. Disease dynamics are also shaped by changing food production and livelihood systems that increase the intensity of contact between domestic animals and between people and animals – as in the case of poultry production systems and avian influenza. Where wildlife disease reservoirs and vectors are involved, environmental and land use changes that affect human contact with these become key.

For instance haemorrhagic fevers such as Ebola, lassa fever and rift valley fever in Africa have been linked to deforestation and population shifts, with contributing political-economic dynamics varying from dam construction to diamond mining, logging and the bushmeat trade. Climate change is likely to bring further influences to ecosystem and land use patterns with implications for disease emergence (Patz 2005).

Thus the emergence of infectious diseases, and their spread and impact, relate to how pathogens interact with a complex of social, technological, and environmental processes. These processes are highly interdependent, non-linear, and often context-specific. They operate over varied and sometimes overlapping temporal and spatial scales. Some disease drivers and effects involve short-term shocks – as in an ecosystem 'switch' that triggers a sudden epidemic outbreak – while others involve longer-term trends and stresses. Disease responses themselves can feed back to shape these dynamics – either positively, for instance where infection is brought under control, or in less intended ways – for instance where drugs contribute to emerging pathogenic resistance. Building effective responses thus requires an appreciation of such complex social, technological and environmental dynamics.

How do poor and marginalised groups experience such dynamics of disease and response? If a first building block of the pathways approach (see Leach et al 2007) is a complex systems perspective, a second is a normative emphasis on reductions in poverty and social injustice as defined by and for particular people and settings. This carries implications for how we think about sustainability – in this case of the socio-technological-ecological-response system involved with any epidemic. Rather than a colloquial definition of sustainability implying the maintenance

of system properties in a general sense, or (following Brundtland 1987) a broad normative usage in which sustainability refers to a broadly identifiable, but often poorly specified, set of social, environmental and economic values, we are concerned to specify versions of sustainability in terms of the particular properties and flows of goods and services valued by particular social groups or in the pursuit of particular goals. Thus in the case of epidemics, sustainability may be defined in terms of sustaining the health of global populations in the face of disease outbreaks. Yet in other versions, sustainability may imply meeting the specific livelihood and social, as well as narrow health, goals of people confronting diseases on a day-to-day basis. Acknowledging multiple, normatively-defined sustainability goals is, we argue, an essential basis for building epidemics governance approaches that contribute to equity and social justice. Yet it is also essential for the effectiveness (and sustainability) of epidemic responses in general; as our haemorrhagic fever and HPAI examples illustrate below, these can be undermined altogether if local populations experience them as inappropriate or unjust, and resist accordingly.

We address the relationship between sustainability and the specific way in which we define and use the concept of resilience later in the article. Nevertheless 'resilience' – as illustrated elsewhere in this special issue – also connotes a broader approach to thinking about change and societal responses to it. In this respect it is worth noting that – like colloquial notions of sustainability – much resilience thinking displays reluctance to recognise this socially-contingent, normative aspect – that how resilience is evaluated depends on context and perspective. Thus we must always ask whose resilience is at stake, in what place, and how unequally is it is distributed, and how greater resilience as experienced by some affects the resilience of others in both positive and negative ways (Berkhout 2008).

3. Framing, narratives and pathways

A further central building block of the pathways approach – drawing especially from the insights of methodological constructivism in the social sciences – is a concern with 'framing', or the different ways of understanding or representing a system. This notion spans a variety of different cognitive, social and discursive processes. For Goffman, 'frame analysis' addresses 'schemata of interpretation' that enable individual social actors 'to locate, perceive, identify, and label' experienced phenomena (1974:21). The concept is extended to address alignments and divergences between contending cultural perspectives (Snow et al, 1986). More recently, Rein and Schön favour a view of frames as 'strong and generic narratives that guide both analysis and action' (1996:89). In our terms, a concern with framing allows attention to the many ways in which system boundaries, dynamics, functions and outcomes are open to multiple, particular, contextual, positioned and subjective assumptions, methods, forms of interpretation, values and goals. As such, divergent framings of the social, ecological and technological implications of 'epidemics' may be held, for instance, by diverse international organisations, technical agencies, sectoral ministries, professional disciplines, civil society groups or diverse local actors (see figure 1).

[FIGURE 1 NEAR HERE]

So whereas resilience thinking seeks comprehensively to reflect a full range and diversity of elements, linkages and dynamics in a system and its environment, the pathways approach adds a

reflexive dimension. This recognizes that all analysis – whether by researchers, policy actors, or different local people requires framing, and that all framing involves not just choices about which elements to highlight, but also subjective and value judgements. These lead to different ways – with respect to a particular issue or problem – of, *inter alia*: setting agendas, defining goals; characterising options; posing questions; prioritising issues; deciding context; setting baselines; drawing boundaries; discounting time; choosing methods; including disciplines, expertise or informal knowledge, and handling uncertainties (Stirling, 2008a).

Particular system-framings often become part of narratives about a problem or issue (Leach et al forthcoming). These are simple stories with beginnings defining the problem, middles elaborating its consequences and ends outlining the solutions (Roe, 1994). Narratives are created and promoted by particular actors, networks and institutions. They often start with a particular framing of a system and its dynamics, and suggest particular ways in which these should develop or transform to bring about a particular set of outcomes. Narratives therefore suggest and justify particular kinds of action, strategy and intervention. Some narratives, in turn, come to be supported by institutional and political processes – governance – so as to define and shape pathways: particular directions in which interacting social, technological and environmental systems co-evolve over time. Other narratives, meanwhile, may not become manifested in actual pathways of intervention and change, remaining marginalised.

Thus, amidst growing global concern with epidemics and emerging infectious diseases, a variety of policy debates and responses is emerging. These often combine elements of long-established approaches to disease control – pharmaceutical and vaccination interventions, public health

measures, surveillance and so on – with newer concepts and approaches, for instance in alert and response infrastructures, and notions of health security. Yet, despite the prevailing complexity in disease dynamics noted above, epidemic governance approaches tend to be selective. In the case of pandemic threats, an 'outbreak narrative' is often pushed by international agencies and governments in northern settings. As Wald puts it:

> [this] begins with the identification of an emerging infection, includes discussion of the global networks throughout which it travels, and chronicles the epidemiological work that end with its containment. As epidemiologists trace the routes of the microbes, they catalogue the spaces and interactions of global modernity. Microbes, spaces, and interactions blend together as they animate the landscape and motivate the plot of the outbreak narrative: a contradictory but compelling story of the perils of human interdependence and the triumph of human connection and cooperation, scientific authority and the evolutionary advantages of the microbe, ecological balance and impending disaster (Wald 2008:2).

The narrative therefore frames the system in global terms. It focuses on a particular interpretation of disease dynamics (sudden emergence, speedy, far-reaching, often global spread) and a particular version of response (universalised, generic emergency oriented control, at source, aimed at eradication). More subjective dimensions include the value placed on protecting global populations, which often implies protecting particular populations in richer countries. Goals are defined in terms of impacts on human mortality and national economies and business viability. This narrative calls upon particular kinds of knowledge and expertise – notably formal science

and epidemiology – in diagnosing and solving the problem. In Rosenberg's (1992) terms, it involves a 'contamination' approach to understanding and addressing epidemics – focused on disease transmission – rather than a 'configuration' explanation emphasising disease context.

Such an overall outbreak narrative has been typical of the international responses to HPAI, for example, with distinct versions associated with veterinary, human public health and pandemic preparedness strands of the response. The HPAI outbreak narrative in particular has been framed in terms of a globalised version of 'health security' (Scoones, 2010; Scoones and Forster 2008, see WHO 2007). This, in turn, has given rise to a plethora of initiatives and associated institutional arrangements focused on early warning, risk assessment, intensive surveillance, outbreak monitoring, pandemic preparedness planning, rapid response teams, contingency plans and so on. Dominant narratives around Ebola similarly emphasise short-term, acute outbreaks requiring rapid identification and control – to 'stamp out' the outbreak and prevent dangerous spread to neighbouring and ultimately global populations (Leach and Hewlett, forthcoming, Heymann et al, 1999). Thus when an outbreak of Ebola was confirmed in the Democratic Republic of Congo in December 2008, Angola closed off their border with the affected region, having placed their police and military on high alert (Bhatia 2009). Specific elements of the international response have included the creation by the WHO of a revised set of International Health Regulations in 2005 (IHR, 2005) and of the Global Outbreak Alert and Response Network (GOARN) (WHO, 2009) which mobilises multiple agencies to respond to epidemic shocks as they arise. The 1995 Ebola outbreak in Kikwit, DR Congo and the 'perception that the Kikwit outbreak was going to spread to the rest of the world' (interview, WHO, July 8 2008) is

reported as 'key to building political momentum' in the processes leading to the creation of these institutions (Heymann et al 1999).[2]

There is nothing inherently wrong with such outbreak narratives, both in terms of problem diagnosis and solutions. Yet they do miss out on some critical elements of system dynamics and goals and, in dominating, obscure alternative narratives which suggest different solutions. One alternative narrative, for instance, promoted by a number of social scientists, technical agencies and non-governmental organisations, emphasises a local intervention model focusing on active intervention in a particular setting to reduce disease risk and exposure. This has a more developmental mode to the emergency response outbreak narrative, focusing on the structural causes of inequity and disease vulnerability amongst particular populations (Farmer 1996), and addresses the long-term implications; for instance for the case of HPAI boosting the capacity of public health and veterinary services, the bio-security of market chains and so on (Scoones and Forster 2008). It can embrace attention to long-term changes in human-animal-environment interactions (e.g. trends in farming, livelihoods and land use in the context of climate change) as a focus for development and adaptation (e.g land use and ecosystem interventions such as integrated vector management) (Parkes et al 2004; Waltner Toews and Walls 1997). In some versions of this narrative, disease ecology comes to the fore, with attention to the often-unpredictable ways that viruses, social and environmental dynamics co-evolve in particular settings such as to render particular people and places vulnerable (Slingenbergh et al 2007). Thus deforestation through agriculture and logging, and its political, economic and poverty-related causes has been assumed to contribute to haemorrhagic fevers, by bringing populations closer to

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[2] Media interview with Guenal Rodier, Director of International Health Regulations Co-ordination, www.who.int/bulletin/volumes/85/6/07-100607/en/index.html, accessed July 2008.

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their forest animal viral reservoirs and secondary vectors. Yet many questions remain

unresolved, and causative patterns uncertain. Ebola's natural reservoirs and transmission cycle

remain ambiguous, with competing theories – centred on bats and rodents – in play (Morvan et al

2000). Outbreaks of haemorrhagic fevers have often centred on the forest-savanna ecotone,

suggesting interactions with non-linear forest-savanna dynamics and land use (Fairhead and

Leach 1998), and with agricultural and bushmeat-trading livelihoods (Hardin forthcoming),

which will themselves be influenced by the uncertain effects of climate change.

In a second alternative narrative, infectious diseases are seen as more endemic than epidemic;

long-present amongst local populations who have developed culturally-embedded ways to live

and deal with them, as with haemorrhagic fevers for example (Hewlett and Hewlett 2008). Local

knowledge, practices and concerns can, so this narrative argues, inform and be integrated into

participatory surveillance and response strategies, helping to make these more context-specific,

locally appropriate and acceptable (Calain et al 2009, see also Bausch et al 2007). For instance

amongst Acholi people in Uganda, local framings of disease dynamics include the concepts of

both endemic and epidemic (*gemo*) disease. In the 1999-2000 Ebola outbreak, the international

teams initially did not realise that the local people had an existing cultural model to explain the

nature, transmission and prevention of the disease. However assisted by the work of

anthropologist Barry Hewlett, local cultural logics and the elaborate social protocols which they

triggered were successfully integrated into the response.

These are just a few examples of the many contrasting and competing policy narratives that

circulate about epidemics and responses – and particular diseases, settings and institutions offer

their own variants (see for example Edstrom 2008 on HIV/AIDS, and Bloom 2008 on SARS). Across the board, though, narratives always interplay in ways shaped by politics and power. In many situations, we find that contextually powerful institutions assert particular narratives and framings, so that it is these that become interlocked with strategies of intervention and ensuing pathways of system change, marginalising alternative narratives in the process. These contextually powerful narratives are evident, for instance, in the policy documents, publications, funding agendas, and communications of international and governmental agencies, as well as in supportive media and popular understandings generated around these. Thus documentary reviews and interviews with key players in international agencies reveal how the notion that 'avian flu is a global security problem' predominates over alternative narratives that 'avian flu is a local livelihood problem' (Scoones and Forster 2008); and that the view that 'Ebola is an emerging disease out-of-Africa' is far more prominent in international discourse than narratives that 'Ebola is an endemic problem linked to localised long-term socio-ecological processes' (Hewlett and Leach forthcoming). All too often the marginalised narratives are those voiced by or representing the perspectives of marginalised people. In part, the relative power of epidemic narratives reflects the position and status of their proponents on an international stage. However, as we explore further below, a range of political, institutional and cognitive pressures may interlock in processes of governmentality (Burchell *et al.* 1991: 2) so that certain views become interlocked with more diffuse power relations.

4. **Governance and strategies for sustainability**

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Constructed in relation to outbreak narratives, the strategies for intervention and modes of governance that have come to dominate international epidemics responses – and thus the pathways of system change promoted – have some major shortcomings when it comes to dealing with the full range of systems dynamics involved with disease and ecology in a complex world. Despite this, such approaches are remarkably powerful and persistent. We now go on to address this dilemma, considering why it is that the kinds of strategy needed to promote sustainability are so often not pursued in practice as a result of political, institutional and cognitive pressures.

Narratives about actions aiming to promote sustainability involve assumptions about both the temporality of change – are changes seen as short-term shocks or long-term stresses? And about the styles of action – is the aim to control change, or to respond to it? These are important practical distinctions that are often elided or ignored in existing literatures, suggesting in turn a specific definition of resilience (as distinct from its broader usage). Figure 2 maps out these distinctions, and the properties of sustainability associated with them (Stirling, 2007a). The vertical axis rests on a distinction between temporalities of change – the dynamics of the system in question. Here, changes may be characterised mainly as shocks (transient disruptions in an otherwise continuous trajectory) or as stresses (enduring and pervasive secular long-run shifts). The horizontal axis rests on a distinction between different kinds of strategic action or intervention. Here, sources of disruption may be seen as amenable to control, or susceptible only to more modest forms of response. Such styles of action reflect the distinction between more conventional control-oriented management, and responsive, adaptive management (Perrow, 1999; Weick and Sutcliffe, 2001).

[FIGURE 2 NEAR HERE]

Thus we might ask, within any given policy narrative, are intervention strategies aimed at exercising control in order to resist disturbance or shocks to what is otherwise assumed to be an essentially unchanging trajectory (stability)? Or is there an acknowledgement that there may be limits to control, and thus that interventions should resist shocks in a more responsive fashion (resilience)? In other circumstances, the system may be subject to important stresses, driving long run-shifts. In this case, interventions might attempt to control the potential changes – aiming at durability. Alternatively, embracing both the limits to control and an openness to enduring shifts would suggest strategies aimed at robustness.

The four dynamic properties mapped out in this diagram might be seen as individually necessary and collectively sufficient elements of sustainability. In practice, however, there is often a tendency for policy narratives, and their associated intervention strategies, to drift towards the top left corner of this diagram. Thus, governance for sustainability is all too frequently characterised narrowly in terms of stability. In dealing with epidemics, many outbreak narratives focus on stability in their emphasis on 'stamping out' short-term disease shocks to return to a previous status quo. For example responses to outbreaks of Ebola in East and Central Africa have involved rapid response, containment and public health measures to limit contact and spread (Heymann et al, 1999). This is a classic case of a control-oriented response to a short-term shock, with the aim of ensuring stability.

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A range of institutional and political-economic pressures is involved in encouraging such 'drift'. Power dynamics inevitably encourage and enable powerful institutions to pursue strategies that maintain the status quo. Eradicating a disease or controlling an epidemic – or at least claiming to do so – is a powerful way of asserting political authority, whether this is the authority of an international health regime or of a national political one – as in Mugabe's doubtful claims to have eradicated cholera in Zimbabwe.

Furthermore as has been argued elsewhere (Scoones et al, 2007), a preoccupation with the property of stability is associated with the prioritisation of routine responses, applied within a domain of normal agency and control. These routine responses in turn become the 'repeated practices and behaviours' that constitute institutions (following Douglass North, 1990). In the case of avian influenza, for example, such routine responses and institutionalised practices are encoded in the standard, global surveillance, early warning and rapid response repertoires of the main agencies (Scoones and Forster 2008; see figure 3). Huge amounts of public cash have been invested in these, bringing financial and economic pressures to maintain certain styles of response and their associated funding streams (Calain 2007).

[FIGURE 3 NEAR HERE]

Added to these are professional, disciplinary and cognitive pressures. These include the dominance of disciplinary cultures – often centred around biomedicine and epidemiology – which value quantitative, disease-focused assessments over more complex analyses which might

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emphasise longer-term, less equilibrium dynamics. Understandings from ecology, history, social sciences and local knowledge are thus squeezed out (Dry and Leach forthcoming). Related are tendencies to represent disease dynamics as knowable and controllable, amenable to framing in terms of probabilistic risk assessments, downplaying less tractable dimensions of incertitude (Stirling and Scoones forthcoming). Finally, the media often plays key roles in supporting and amplifying powerful outbreak narratives and associated public fears, in turn generating weight and appeal for powerful agencies' claims to control the threat (see Wald 2008).

The point here is not that the property of stability is always necessarily invalid, but that there exist powerful pressures to exaggerate its salience or importance. This, in turn, means that the other dynamic properties of sustainability are left unaddressed or underplayed. Of course, this point is well established in much of the existing literature concerned with resilience, even if the terminology is not used in the strict sense defined in figure 2. Thus discussions of socio-ecological resilience show a strong appreciation for the ways in which disruptions may arise that are beyond the reach of conventional instruments of control (Walker and Salt 2006). Strategies for securing stability are thus (in this literature) widely acknowledged to be misguided, or at least incomplete. Instead, emphasis on more modest ('adaptive') response strategies is encouraged (Olsson et al 2006).

What of the other dimensions of sustainability in mainstream pathways of epidemic response? Attention to these is often limited. In the case of HPAI, the fact that the global response infrastructure is being built for a human influenza pandemic that has not yet happened – and it is uncertain whether or when it will – is an indication that attention to external shocks – and thus

resilience is at least on the agenda. However, since such responses are outside the normal, routine practices of institutions, no-one is sure whether these responses will work. There is thus frequently a reversion to the language of stability in many narratives (Scoones and Forster 2008). The WHO's Global Outbreak Alert and Response Network (GOARN) is also framed as suited to dealing with unpredictable external shocks in the sense that outbreaks will arise, but their risk, and timing and place, cannot be foreseen[3]. A flexible response network that can be mobilised as and when needed can, in this context, be seen as a strategy for resilience. Yet the response thus mobilised emphasises one-off, short-term disease eradication efforts, often with little attention to less controllable dynamics.

Turning to the vertical axis in figure 2 and the property of durability, longer-term, pervasive secular changes are also neglected in epidemics governance. For instance, in both the cases of HPAI and haemorrhagic fevers, there are questions over how response infrastructures might respond to longer-term evolutionary changes in viruses and their ecological interactions – or of encompassing developments in public health institutions and capabilities. In this way that the property of durability is down-played at the expense of stability.

Finally, there is the property of robustness – a conjunction of challenges both of intervention and change as represented in the bottom right of figure 2. Like durability, this requires consideration of possible stresses towards secular long run shifts in conditions. But, in this case, these lie beyond the ready reach of control. In dealing with Ebola, there exist numerous examples of this latter challenge of robustness: changes in viral susceptibility in different populations, long-term shifts in forest-savanna dynamics and their effects on the populations of rates which are the main

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[3] http://www.who.int/csr/outbreaknetwork/en/, accessed 19 January 2009

vectors for the disease, ecological shifts and stresses resulting in more human-animal contact, and the effects of climate change on these. These issues have not been addressed at a fundamental level in mainstream policy narratives. There is an argument (usually geared to funders), that investment in epidemic responses and infrastructure networks at a global level will proof the system against future outbreaks by improving capacity (surveillance, diagnosis etc.) – and so ensuring, it is implied, durability and robustness. Yet there is very little attention to the specific challenges presented by long-term, external changes which are not amenable to prediction and control.

In sum, then, conventional policy responses to epidemics represent challenges of sustainability mainly in terms of stability. These are in essence 'equilibrium' responses – seeking new forms of stable state through a set of interventions, guided by a particular set of knowledge framings, generated by particular practices and institutions. This creates a particular pathway – or trajectory for socio-technical and governance intervention and change.

In some circumstances such pathways may be appropriate and effective. Certainly, there is evidence of success with 'outbreak narrative' driven- responses – with the rapid eradication of SARS being a widely-cited case in point (Bloom 2008). However, as our discussion above has illustrated, such stability-focused outbreak-narratives and associated pathways also miss out on a range of issues – and this may prove to be their Achilles heel as nature and people 'bite back' in unanticipated ways. First, by failing to take account of external, longer-term, less controllable dynamics, strategies may miss important shifts in disease ecology or social-viral dynamics, with serious consequences or missed opportunities. Thus, for example, recent research indicates that

Ebola may respond to ecosystem dynamics in non-linear ways, with outbreak events being enviro-climatically coupled with long-wave and seasonal dynamics of drought (Walsh et al 2005, Pinzon et al 2004). Sharply drier conditions at the end of the rainy season may act as trigger events to enhance transmission of the virus from its cryptic reservoir to humans. Links between ecosystem change, vector dynamics and disease are also mediated by patterns of land use which shape people's contact with animals (see Lambin 2008). In the case of Ebola, the multiplication of contacts could occur through agriculture or logging, which bring people into closer contact with forests and lead to movement and modification of forest fauna. The interactions of settlement, soil use, farming, fire, animals and local institutional arrangements have led to processes of forest advance and biodiversity enrichment as well as decline in west and central Africa, over overlapping temporal and spatial scales (see Fairhead and Leach 1996, 1998), potentially creating new niches for viral emergence and human-vector contact. Thus whereas short-term response models may be highly effective for Ebola at the scale of each individual outbreak, they may founder if the system is framed over larger temporal and spatial scales. Evidence that Ebola outbreaks are increasing in frequency and severity underlines the relevance of such longer-term dynamics and of intervention in them – for instance through land use and ecosystem-based entry points – to interrupt potentially dangerous cycles of viral-animal-human co-evolution (Kuiken et al 2003). Without this, the deployment of 'rapid response' mobilisation for ever-shifting, more frequent outbreaks threatens to place intolerable strain on institutions and resources.

Second, by failing to take account of questions of social justice and the distributional aspects of experiences of both disease and responses, strategies may worsen further the health or

livelihoods of poorer groups. Further, strategies experienced locally as inequitable may incite

resistance which derails the interventions. Thus, for instance, the effects of large-scale poultry

culling in the HPAI response on small-scale Asian farmers' livelihoods have been great; farmers

have often responded by hiding their birds and refusing to report disease, so undermining

surveillance efforts (Scoones and Forster 2008). Similarly, the resistance of African villagers to

heavy-handed Ebola control teams has been well documented (Leach 2008, Hewlett and Hewlett

2008). In Gabon in 1995-6, for example, American and French control measures were perceived

as so inappropriate and offensive by villagers that they aroused deep suspicion, and international

responses to a further outbreak there in 2001 met with fierce local armed resistance (Milleliri et

al 2004). Hewlett and Hewlett (2008) document how people resented the prevention of their

ability to carry out customary burial practices, and how the hiding of sick and dead relatives in

tarpaulined isolation units led people to suspect that their body parts were being stolen. These

particular instances which incited worry and resentment interplayed with a broader distrust of

international teams 'parachuted in' from outside with little apparent appreciation of villagers'

own experience in living and coping with Ebola.

5. A new agenda for health governance?

What modes of governance would enable the building of epidemic response systems which are

sustainable in the face of complex systems dynamics, and which respect the values and priorities

of those most vulnerable to disease? This is clearly a huge question, and one which needs to be

fine-tuned in relation to particular diseases and settings. However our analysis of narratives and

pathways, as illustrated by the cases of haemorrhagic fevers and avian influenza, offers some pointers as to specific shifts in thinking and action which need to be part of health governance agendas.

First, there is a need to 'open up' beyond the singular narratives and associated pathways which dominate current agendas, to embrace a range of alternatives (Stirling, 2008b). The currently dominant narrative, focusing on an 'outbreak' framing and its global implications, is clearly important in some situations. Alternative narratives do not reject the importance of such a framing, and the pathways of disease response that it informs and justifies, but they do draw attention to vital complementary and additional understandings. These are important particularly in situations where outbreaks are a manifestation of underlying, longer-term social, disease and ecological dynamics, and where outbreaks occur in settings where diseases are endemic. Alternative narratives also highlight issues, understandings and forms of knowledge which are vital to ensure that outbreak responses are attuned to local ecological and social circumstances, and so actually work. The policy challenge is therefore to open up this array and make the more hidden alternatives explicit, elaborating their implications and trade-offs, and attuning the choice and selection of (often) multiple pathways to particular settings. This in turn will require appraisal approaches that are able to reveal diverse framings of epidemics issues, including those grounded in the knowledge and perspectives of people living with disease on a daily basis. And it will require approaches to governance that are reflexive (Voss *et al*. 2006; Stirling, 2006; Smith and Stirling 2006) – whereby actors and institutions engage with and reflect on the ways in which framings of 'the system' are themselves plural, contingent and conditioned by divergent values, interests, disciplinary perspectives and institutional commitments – and deliberative,

bringing different people and groups holding different perspectives together in facilitated dialogue, argumentation and engagement with problems (Fischer and Forester 1993; Hajer and Wagenaar 2003).

Promising steps in these directions have, for instance, been taken by the WHO in its responses to Ebola, which since 2001 have integrated anthropologists into outbreak response teams to help epidaemiologists and clinicians to understand and work from local disease framings (Hewlett and Hewlett 2008). In 2008, the Director of Outbreak Alert and Response Operations (Interview, Geneva, 8 July 2008) claimed that 'anthropological integration is now a key pillar of our response strategy – as important as isolation….this was not the case ten years ago'.

Second, more attention should be paid to those narratives which emphasise hitherto neglected dimensions of sustainability – resilient responses to disease shocks, and robustness in relation to long-term social and environmental dynamics – attuning interventions and strategies accordingly. Put another way, a major challenge for the governance of epidemics and infectious diseases is to promote pathways that reverse the closing-down towards the top left hand corner of figure 2, encouraging a move to open-up and embrace other quadrants. This represents a frontier area in health governance. In moving in these directions there is scope to apply to the epidemics/infectious disease field some key insights elaborated in broader thinking about social-ecological resilience and governance in situations of complex change. In brief (see Leach et al forthcoming), to be effective against shocks (stability or resilience), vigilant interventions are needed – ones based on rapid identification of the nature of the shock and how to respond. On the other hand to be effective against stress (durability or robustness), interventions need to be

based on foresight which picks up on and reacts to longer-term signals. Strategies geared to these different dynamic properties of sustainability also require different kinds of institutional arrangement. Thus strategies intended to foster stability can be based on rigid infrastructures, capable of controlling shocks whilst retaining their structural form. The property of durability, by contrast, will require institutions tailored for persistence in the face of long-term pressures. Strategies for resilience differ from both of these in placing a premium on flexible institutions that can absorb uncontrollable shocks and bounce back afterwards. Finally, the property of robustness requires infrastructures and institutions to be adaptive in the face of uncontrollable long-run shifts in conditions. These practical distinctions are of crucial relevance to how international agencies, government, policy-makers, practitioners and civil society actors concerned with health governance work and interact.

In building institutions and strategies for resilience and robustness, insights from work on adaptive governance in the context of ecosystems are helpful, emphasising the value of self-organising and self-enforcing networks of individuals, organisations and agencies that have the capacity for flexible, collaborative and learning-based approaches (Folke *et al*. 2005, Olsson *et al*. 2006). While there are few examples in the epidemics field, the avian influenza response illustrates some moves in this direction – for instance in successfully networking different agencies within the UN system, with the coordinating group, UNSIC, offering what is in many respects an exemplary light-touch approach to facilitation and co-ordination of profile, fund-raising, action and learning across, and outside, the UN system (Scoones and Forster 2008).

Third, explicit attention needs to be given to issues of social justice and how the particular framings, sustainability goals and livelihood concerns of poorer and marginalised people are responded to. This will require careful balancing and thorough deliberation of alternatives, involving a wider participation of people in health and disease planning and the implementation of responses, including those directly affected. It may also be facilitated by citizen mobilisation around the perspectives, rights and claims of people living with disease. Thus as the international NGO Medecins Sans Frontières (MSF) found through experience of the 2005 Marburg outbreak:

> ….biosafety and epidemiological efficacy alone are not sufficient to make a filovirus haemorrhagic fever (FHF) intervention effective. Involving local authorities and respected influential individuals is an established principle of public health interventions in the community. Yet this principle is easily forgotten in the heat of an FHF outbreak. When MSF involved such authorities, community relations improved promptly and significantly, ameliorating case finding and outbreak control.[4]

The final challenge is to allocate resources, and deliver the type of capacity – in terms of expertise and institutional arrangements – that allow this 'opening up' of health governance to happen. This may not be easy. As we have explored, the existing professional and institutional configurations of global and national health systems are often not geared up to encompass alternative pathways, and substantial institutional reform and capacity development will be required. Taking advantage of new openings in existing arrangements and platforms for debate

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[4] Quote by Matthew Borchert, a clinician seconded to MSF, in news article 'In order to contain Marburg and Ebola outbreaks agencies must win trust of locals', http://www.medicalnewstoday.com/articles/87136.php, accessed 16 September 2009.

and action to forward new perspectives is vital in this respect. For instance the One World, One Health platform, launched in 2008 in Egypt, offers a way forward in integrated human, animal and ecosystem health across spatial scales, with attention to questions of livelihoods and poverty (OWOH 2008). The pathways approach introduced here may assist in elaborating the practical and governance implications of this, and the particular challenges of addressing complex dynamics and social justice goals.

6. Concluding discussion

In outlining key elements of a pathways approach, this article has offered a novel conceptual framework for conceptualising the governance challenges associated with epidemics in a complex, dynamic world. Drawing on this approach, with its consideration of system-framing, narratives and the political, institutional and cognitive pressures which close-down to privilege only selected dynamics and goals, and using the examples of haemorrhagic fevers and avian influenza, it has described some current shortcomings in health governance and explored some of the reasons why these failings persist. In this light, the article has highlighted some ways forward, suggesting elements of a new governance agenda directed towards building epidemics response pathways which are sustainable and socially just.

Bringing about such broad reorientations of governance approach is, we argue, essential – in the field of epidemics and infectious diseases, but also by implication in other areas of complex, dynamic change (Scoones et al 2007; Leach et al 2007). Yet, it is also deeply challenging, given

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the current entrenchment of outbreak narratives and conventional stability-focused perspectives in existing political and institutional arrangements. Dominant narratives and associated pathways gain and maintain power as particular forms of knowledge and system-framing, knowledge, professions, political interests, goals and values, organisational arrangements and bureaucratic routines mutually reinforce each other, creating particular pathways and marginalising others. Building pathways to sustainability must involve recognising and addressing the power-laden interplay between pathways. This includes being explicit about conflicts and trade-offs between them, as well as areas where there is scope for complementarity, alignment and integration. It includes challenging pressures that enable certain pathways to remain dominant to the exclusion of others. And it involves actively highlighting and building political and institutional support for less dominant alternative pathways, including those that address the full range and implications of dynamics, and which support the goals of particular marginalised groups.

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