

A Framework to Approach Planning for Resilience

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Abstract

Security professionals do not have good tools for planning and managing complex systems that make states and communities function. Here we present a framework for thinking about resilience in the face of multiple, sometimes synchronous shocks which threaten stability, human and national security. We propose a framework beginning with the foundations of productivity, centered on the natural environment. Providers draw on these foundations, to supply food, shelter, transport, finance, policing, and so on, but governance plays a vital role in policy responses and preemptive planning. The framework identifies enablers and externalities that affect the continuity or security of complex systems. The value of the framework lies in providing ways to examine and communicate about the complex interactions that affect human and national security over time, as security professionals grapple with emerging threats such as climate change, population movements, and resource depletion.

Keywords: resilience; environment; security; planning; and resources

We teach officers and staff planners in national defence and other government departments, and we are concerned that there is a gap in the tools for thinking about shocks to society at a systemic level. Majors and Colonels are good at planning operations, but may lack the mental models to understand emerging threats to society.

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This article contributes a framework encompassing the major systems that allow a society to withstand and adapt to shocks from natural and human challenges, wherever they might originate. It should help communities to reduce vulnerabilities resulting from human and natural disasters. Understanding systems related to synchronic shocks is important because soldiers, police, and emergency responders may not be well equipped to restore essential life support systems like water and food supplies once they have deteriorated or collapsed. They must think through the connections before problems arise.

The first section defines important concepts and reviews literature about resilience. The second section elaborates the framework. The final section summarizes arguments and opens avenues for further discussion and research.

1. What Does the Literature Say About Resilience?

We take a shock or stress to be anything that reduces the ability of a social system to function, and includes natural phenomena like fires, floods, droughts and earthquakes, intentional threats like wars or attacks, and human-natural interactions such as infectious epidemic diseases or mass migrations. Shocks or stresses in a complex political, economic, social, and environmental system can take many forms. Major systemic stresses like population fluctuations, climate change, and environmental degradation have historically been the harbingers of the collapse of civilizations (Morrison, 2006).

Resilience “is the ability of human communities to withstand and recover from stresses, such as environmental change or social, economic or political upheaval. Resilience in societies and their life-supporting ecosystems is crucial in maintaining options for future human development.” (www.Stockholmresilience.org) National security is achieved by preserving state institutions that permit autonomous national decision-making within the international system. Human security is achieved by meeting basic human needs—from physical safety, food and shelter, to self-actualization—for all groups within a society. It is possible to have national security without human security for many groups and individuals. It is equally possible to improve human security while neglecting national security.

What do we know about resilience and societal collapse? The Stockholm Resilience Centre focuses much of its work on the environment.

At the global level, systems that sustain life on the planet include the atmosphere, oceans, oxygen-producing and -consuming organisms, and general levels of toxicity. Human and natural responsive systems tie the planet to the microscopic level. Sub-systems solve particular national and social problems, like the air-traffic control system that Homer-Dixon describes in the *The Ingenuity Gap*; it is a complex distributed system that keeps air traffic safe, but appears increasingly overloaded (Homer-Dixon, 2002). Our focus is on the system level.

We face an era of accelerating human-induced environmental change (Biggs et al, 2007). Systems can self-correct up to a point, but either macro-level external shocks, or incremental weakening of self-regulated systems lead over time to major systemic changes. Eutrophic deterioration of lakes illustrates the point. Nitrogen-rich run-off combines with internal factors like reduced efficiency of plant activity due to pollution, and at some point the lake “dies” quite suddenly. Biggs describes this as a systems change from one state to another—difficult to predict, even when tracked over time. Mathematical models have limited utility for planning (Mintzberg, 1994a, 1994b). Pilkey-Jarvis and Pilkey (2008) illustrate this point with the collapse of the Canadian fishery despite monitoring. Rather, the holistic view of biologist E.O. Wilson in *Concurrence* helps us to understand the interconnections, but falls short of providing a planning tool.

Social scientists like Neil Adger tend to approach the problem from the other side – beginning with social and political change. Adger defines resilience as: “...the ability of groups or communities to cope with external stresses and disturbances as a result of social, political and environmental change.” He argues that social and ecological resilience should be studied together (Adger, 2000, 349), but does not address the problem of national security in a potentially hostile or competitive international environment.

The World Bank, United Nations Development Program and OECD are also concerned with resilience. The World Bank’s analysis of Haiti noted:

Haiti is a resilient society whose rural communities in particular have developed coping mechanisms in response to a long history of underdevelopment and political instability... also beset by widespread poverty and inequality, economic decline and unemployment, poor governance, and violence. (World Bank, 2006, i)

The World Bank study identifies three mutually reinforcing factors contributing to the conflict-poverty trap: demographic and socioeconomic factors at the household level; weak state institutions lacking the capacity to provide public goods or manage risks; and a vicious cycle of destructive agendas and strategies by political actors.

Much of the resilience literature focuses on grass roots and community initiatives. Vogt (2002) describes local *machizukuri* initiatives to safeguard historic neighbourhoods from fire and earthquake in Japan, after the government policies of the 1960s failed. Others find local responses to environmental disasters more flexible and effective than international NGOs (Bankoff and Hilhorst, 2009). Local resilience is a component of national resilience, because it affects the ability of the state to sustain itself.

Major systemic changes impact large areas and populations. Drought in the Horn of Africa has recurred with increasing frequency and severity in the last decade. The threat of climate change to small states demands mitigation and adaptation strategies. Climate change generates migration, refugees and displaced people. This poses threats to states with few resources and weak institutions (RSIS, 2009). International norms for human rights, equality, and liberal democracy are beginning to conflict with state management of environmentally induced refugee flows (Kolmannskog, 2008).

Awareness of complex systems at the global level is especially important because much of the most useful work on resilience has been done at community and sub-system level. Planners need a layered framework showing the interaction of factors that affect the resilience of national and social institutions. Security leaders have not traditionally planned in advance for mitigation or adaptation, but may become increasingly involved in consequence management.

Our review of literature combined with our experiences (teaching to civilian and military students, and to staff planners in national defence and other government departments as well as our work experiences in industries and emergency aid) lead us to conclude that there is a gap in the tools for thinking about shocks to society at a systemic level. Our proposed framework intends to bridge the gap.

2. A Framework for Approaching Resilience

Social systems are complex. We will not elaborate on complexity as a social paradigm (Youssofzai and Hafsi, 2004) but note that in a complex system, many factors interact together in a nonlinear way, and cause and effect are not necessarily direct or mono-dimensional (Youssofzai, 2011; Pawson, 2006). Consider water. Dipping a bucket in a stream is simple; turning on a tap initiates a more complex interaction. Water supply is governed by technological, political, social, and economic factors. The concept of productivity also merits examination. Small, diverse market gardens may produce more calories per square meter than large industrial grain farms, but the total volume of production by the latter is currently greater than the former (Philpott, 2012).

Our framework (Figure 1) is designed to help planners to (i) understand the major factors that affect security and resilience, (ii) assess the interaction of macro-level stress and shock, and (iii) plan and take action. It simplifies complex interactions, but provides “hooks” on which to hang ideas and concepts relevant to the immediate problems of decision makers.

The framework is what cognitive scientists call a “mental model” (Merton, 2013). Decision makers and stakeholders can use it as a “*walking stick*” (Hafsi & Thomas, 2005) that helps manage the complexity of resilience. The framework can be used to assess the trade-offs between the most important variables that are related to resilience. Of course it is a gross simplification of reality, and there is room to add more factors but the more factors we incorporate the more complicated it will become. Merton argues “incompleteness” of a framework is not a problem, only “incorrectness” is; he reminds us the “... *mathematician Kurt Gödel proved that no model is “true” in the sense that it is a complete representation of reality...*” (Merton, 2013, 52).

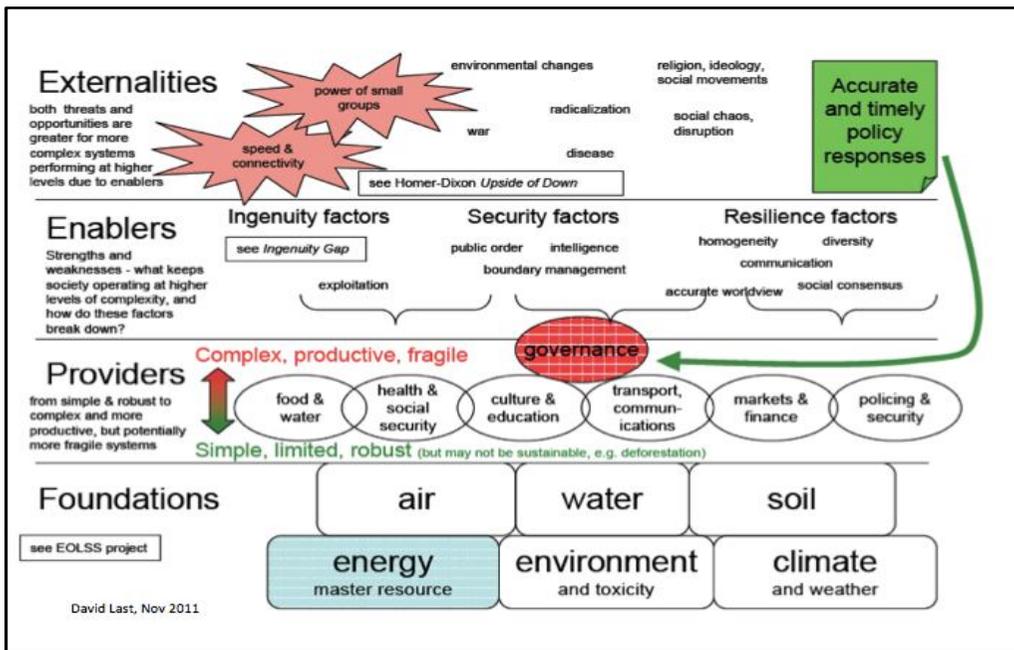
The rows in Figure 1 can be read from the top or bottom. From the bottom, systems of climate, environment and energy determine whether we have clean air, usable water (where and when we need it) and productive soil.

Providers convert resources into goods and services. For example, gardeners convert soil, water and solar energy to vegetables—a comparatively simple and robust process, but with much more limited capacity than industrial farms that mass-produce vegetables.

Factory farming requires capital and labour, irrigation, fertilizers, transport to more distant consumers, marketing, and so on. Mass production is more complex and more productive, but potentially more fragile; soil depletion, labour shortages, transport bottlenecks, and fuel shortages can affect the food supply. Similar narratives can be developed for providers of other goods and services: health and welfare, culture and education, transport and communications, markets and finance, and policing and security.

Externalities affect enabling factors, but also foundations. If a state or market is dependent on resources from an area whose population becomes radicalized, perhaps as a result of perceived exploitation, then the dependency becomes problematic. Environmental change can cause population movements (Black, 2001). Epidemic diseases and wars can exacerbate problems, but might help resolve land and resource depletion. How long does it take for externalities and foundations to affect each other? We see these connections readily in a petri dish: abundant food, rapid population increase, exhaustion of food, and population decay, but the dire Club of Rome (1970) warnings remind us that time is hard to gauge.

Figure 1 Thinking about Resilience



If we step outside the hubris of a few big powers, most of the world's 200 or so political units are small enough that the few people concerned with security must have a holistic understanding of resilience, rather than a narrow professional focus. Our framework helps planners think about the context of their operations.

2.1 Foundations of Human Survival

Many studies of resilience infer threats to the foundations on which human survival rests: breathable air, drinkable water, soil that can produce food. Homer-Dixon describes energy as the master resource, which permits other resources to be exploited or converted: with enough energy and ingenuity, seawater can be made potable, and plants can grow on the moon. Environmental factors including pollution, toxicity, climate, and weather affect the capacity of air, water and soil to support life. These factors change over a long time, not a fiscal year, an electoral cycle, or a five-year plan.

Responding to changes in foundations presents fundamental problems for policy. States cannot manage them alone. Useful data are difficult to collect, aggregate, and interpret in ways that lead to feasible policy change, and special interests are often able to cast doubt or block change. Once foundations have been compromised, the time to recover can be measured in generations, but early warning and prevention of deterioration is often beyond our political capacity. Thus national institutions might do no more than monitor air, water and soil, perhaps by collaborating with international organizations.

2.2 Providers

The next layer of the framework consists of providers, who convert resources into goods and services. Living standards have improved through specialization, but compartmentalization brings vulnerability. How many people know how to refine gasoline, build combustion engines, or make steel? How easily could these skills be lost? Many functions are not organized as markets (Thompson, 1971; Scott, 1987; Lind, 2010). Families and governments are the two largest exceptions, and when states and communities are stressed, extended families and governments provide different kinds of resilience.

For each type of provider, we need to ask how they provide, and how vulnerable they are. For this, a continuum is helpful: from “complex, productive, and fragile” to “simple, limited, and robust”. Back-yard vegetables are not dependent upon complex supply chains, but may not feed the family. Most economies are networks of specialized producers, highly productive because they draw on expertise and proprietary information in connected chains. Production knowledge is concentrated. Concentration makes supply chains vulnerable to disruption or destruction of capital. The productivity of complex economies is potentially fragile.

Subsistence economies are less productive, but may not be more sustainable. Market gardens and burning wood are simple alternatives to industrial agriculture and manufactured fuel oils. They require little technology or specialized knowledge and are less vulnerable to disruption but cannot provide as much food or energy. Devore (1968) demonstrated that small isolated populations in richly endowed natural settings can live with relatively little effort, but this is not reproducible in urban society.

We can reduce vulnerability by increasing local capacity, shortening supply chains, and reducing fragile components. These policy choices affect many interests: consumers accustomed to convenience; governments addicted to taxes; and businesses with large market niches. Increasing resilience often means building up simple robust alternatives, developing local sources and replacements for imports, considering stockpiles against short-term disruptions and supply restrictions, making infrastructure safer or more redundant, “more-and-smaller” rather than “fewer-and-larger”.

2.2.1 Food and Water

Water distribution, rate of flow through various uses, and losses due to contamination determine scarcity. We must consider downstream users, catchments and drainage areas, and the sustainability of aquifers. Legal frameworks for collection, privatization, public access and profit incentives set up the potential for conflict. Industrial use competes with human and animal use directly, and because of long-term contamination.

Average water use per person per day varies from over 500 litres in the US to under 100 litres in China (Data360). Toronto sits on a large freshwater lake with three major rivers running through it.

Less secure is Mongolia's capital, Ulaanbaatar: two of three rivers have all but disappeared (Khash-Erdene, 2012). Water can be a national security issue; engineers in Mongolia's National Security Council described to one of the authorsthe possibility of moving the capital, or redirecting rivers to supply it where it is.

Food is more complex than water. It has more sources and forms, and more variable limits, particularly when rationing and local substitutions are considered. Modern cities must be able to import thousands of calories per person per day, or risk collapse. Columbia University studied New York City's food supply by combining national databases for a macro-level view with local case studies to show how food distribution works (Barron et al, 2010). Supply is flexible, and adapts to changing conditions. End-users have limited awareness of food sources, there is little capacity to trace contamination, infrastructure often runs at capacity, and economic fluctuations can interrupt supply. As food movement in New York increases by more than 60 percent in the next 20 years, infrastructure will come under increasing pressure. (Barron et al, 2010). Food security is also connected to public health, sanitation and garbage disposal, economic development and population change, and to competing views of social justice and the role of public policing.

For many of the world's cities, distances over which staples must be imported are increasing, as fuel costs rise and infrastructure becomes congested. Toronto's food strategy document notes that, "Reliance on today's long-distance, energy-intensive food system will soon become more difficult." (McKeown et al, 2010). Most cities have local environmental limits –staplesdon't grow nearby, and urban residents have lost the habits of seasonal storage and local gardening. Capacity to keep large cities fed and watered might be a survival test for the legitimacy of a government, although none of its major security organs is responsible.

2.2.2 Health and social Security

Water and sanitation are more fundamental to health than hospitals and doctors. Public health is frequently under-funded and commands fewer resources than cancer wards and heart clinics. Epidemic disease might eliminate a cross-section of the population, taking away key areas of expertise. Business continuity plans after SARS and avian flu scares served to highlight vulnerability to loss of people with irreplaceable specialized knowledge that took years to acquire.

Few organizations consciously employ redundant staff, so every business and system is at risk even if small numbers of people are lost.

Social security is the general sense amongst ordinary people that they are safe and will be looked after. Like confidence in the banking system and the police, this helps people to behave well towards their neighbours; without it, social relations can break down. If a high proportion of doctors and nurses, police and fire fighters respond to crisis by staying away from work then many health and social security systems will quickly collapse. The fear that they are collapsing may put them under greater pressure because people may try to get what they can before the collapse is complete.

2.2.3 Education and Culture

Literacy permits preservation and transmission of essential information – vital if there are high casualties. Education about specific threats and countermeasures can reduce the sense of helplessness that can unravel social relations. The resilience of the British during the Blitz of 1940 was aided by civil defence measures, social networks of wardens and neighbourhood command structures, mobilization of resources in the public interest, and a culture of public-spirited support for government. Conversely, disaffection and lack of support for the police exacerbated the damage from riots in British cities in August 2011 (Cooper, 2012).

Social capital (defined as networks of relationships that permit action) may be a more useful concept. World Bank studies of post-conflict recovery by communities in Somalia, Cambodia, Rwanda and Guatemala demonstrated that recovery was faster and more effective in communities with greater degrees of inter-communal trust, measured by density and nature of organizations and social networks (Colletta and Cullen, 2000).

2.2.4 Transport and Communications

Fuel and transport costs affect all the other providers. When fuel is scarce or expensive and when infrastructure is destroyed or disrupted, it may not be possible to support large urban centres (Rubin, 2009). Fuel is susceptible to black market disruption and price distortions, and control has national security implications.

Resilient alternatives to motor transport include human and animal transport, privileging small towns and rural areas. The resulting two-tier economy can quickly break down national cohesion.

Communications systems permit personalized and mass information flows, and enable the movement of goods and services, shaping of markets, and risk management (you know before moving goods that there is a market for them). Both mass and personal communications help individuals and groups to respond to changing circumstances, including stockpiling or fleeing. Transport and communications interact with all the other providers in varying degrees.

2.2.5 Markets and Finance

Most production today is dependent on long distance transport and communications. Corporations operate across international boundaries, with long interlocked and fragile supply lines and global networks of suppliers, which have invested in a lot of productive machinery. Market concentration has become a strategic concern,³ and concentration of global food production and supply may emerge as a survival issue for some governments and populations (IFAP, 2002; DFID, 2004). Trading agreements like the North American Free Trade Agreement (NAFTA) tend to accelerate market concentration (IATP, 2010).

Financial markets are integral to other types of markets: suppliers borrow to produce; consumers borrow to purchase; global financial markets make it all possible, but also create vulnerabilities when they are not well regulated. Increasing market concentration can spur higher debt levels as companies buy their competitors (Galbraith, 2012). Galbraith demonstrates that as markets have become more interconnected and global, inequality has generally (not universally) increased, and that one mechanism connecting inequality with instability is the role of financial institutions in accelerating the consequences of debt. Small local banks and credit unions divorced from global markets have less capacity to generate wealth, but less risk than globally connected markets.

³ The Concentration Ratio (CR) and the Herfindahl-Hirschman Index (HHI) are the two most common indices of industry or market concentration. The CR is the percentage of market share controlled by a specified number of the largest firms. The HHI uses the market shares of all the firms in an industry, squaring the share to put more weight on the share of the largest firms. (Dictionary of Economics)

All markets are based on power (Polanyi, 1957; Granovetter, 1985) – the power of an individual to control his own labour and property, and the power to organize, control and direct the efforts of others. Trust permits markets to grow in size and complexity, and trust is the foundation of cash and credit systems in which the medium of exchange has only notional value: “The soundness and the sustained prosperity of the financial system and our economy rely on the notions of fair dealing, responsibility, and transparency.” (Financial Crisis Inquiry Commission, 2011, *xxii*). Markets are both dependent upon and vehicles for the expansion of social capital.

2.2.6 Policing and Security

Policing and security help to establish the trust on which markets are based, but as with other providers, these essential services can work in simple robust ways, or more complex and productive ways. Bridging social capital allows people to trust and interact with strangers (Woolcock, 1998; Woolcock and Narayan, 2000; Colletta and Cullen, 2000). When these social bridges don't exist, people rely on the tighter bonds of family loyalties and blood relationships to ensure trust. Bonding social capital can be functionally cohesive, but combines with other practices like vendetta, blood feud, or simple expropriation by the powerful to conflict with the requirements of a modern economy, inclusive society, and even safe urban life. Effective, impartial policing and justice systems ensure personal and collective security, and are essential for a functioning economy (Robb, 1991). They are part of the inclusive institutions that characterize effective states (Acemoglu and Robinson, 2012). Whether policing and security interacts effectively with providers of social goods and services, or is predatory, depends on governance (Segell, 2000).

2.3 Governance

Governance is steering or direction of effort, and the centre of the model. Good governance is both glue and lubrication that provides an environment in which all the providers can function effectively in highly interdependent systems. Achieving good governance in a steady state is a challenge; maintaining good governance in the face of shocks to major social systems may be beyond many political entities. Yet both accurate and timely policy responses and effective planning and pre-emption are crucial to resilience.

Shocks demand change, but both people and their organizations are subject to *habitus*, or lasting patterns of perception, thought and action (Bourdieu, Dictionary of Sociology). The most likely pattern of action is therefore for an organization to continue until it is too late to change, with serious consequences. Each provider is subject to *habitus*, but with trajectories of change. Given the opportunity, people will consume more; commercial organizations will control larger market shares; more information and material will move farther and faster; policing and security may become more effective, or more predatory and coercive. Governance manages these trajectories. But accurate and timely policy response depends on awareness of the environment. In the framework, these are expressed as enablers and externalities.

Governance determines whether providers function effectively. Barnard (1938) and Drucker (1954) consider governance within the functions and management of business organizations. Selznick (1967) elaborates on institutional leadership – the pillar of legitimate governance. Normally, governments provide or facilitate security, regulation of markets, currency, roads, health, education, welfare, safe drinking water, standards for food purity, and stockpiles to mitigate shortages. In the context of this paper, governance, then, is the vital link that allows a society to evolve more complex and productive service providers.

When appropriately mediated by governance, enablers are factors that allow providers to become more productive or effective. Ingenuity permits problem solving; security permits markets, preserves autonomy and supports strategy; and resilience manages unanticipated shocks. These factors change over time; looting neighbouring cities was once acceptable. Although today's navies probably won't engage in state supported piracy, state-supported companies might still engage in breaking down other countries' control of resources (Bezlova, 2008).

2.4 Enablers

Enablers can serve to help move providers from simple and limited to complex and more productive systems, but they can also serve to accelerate breakdowns of social order if they are not managed effectively through governance.

For example, the “industrial revolution” is a label for new mass production techniques (scientific knowledge plus ingenuity and entrepreneurship), new forms of social organization (factory production, colonization, trade unions, research laboratories), new ways of pursuing security (the London Metropolitan Police and new military technology from howitzers to dreadnoughts and zeppelins). The framework helps identify factors improving productivity, which have ambiguous and interconnected impacts over time: industrial solutions create social problems; social problems generate security responses that may be positive in one generation and negative in the next.

2.4.1 Ingenuity Factors

Homer-Dixon wrote of the ingenuity gap: problem solving allows us to move between an existing and a desired state; ingenuity is a set of problem-solving instructions (Homer-Dixon, 2002, 192). Intelligence (in the common rather than the military sense), technology, and resources are basic ingredients to generate and apply ingenuity.

Territorial expansion, colonialism and externalized environmental costs have been ingenious solutions to some of capitalism’s problems. Better standards of living have been supported by exploitation. When population, resources, and technology are unbalanced, states seek redress through expansion or war (Choucri and North, 1975).

2.4.2 Security Factors

Ingenuity can turn problem solving into conflict. Run out of water? Take your neighbour’s. Security is necessary for resilience. Public order is the stable background against which providers can improve their productive capacity. Managing boundaries prevents actors from transferring their problems to another jurisdiction. Intelligence (in the military sense—the collection and analysis of strategically useful information) helps to guide and direct security resources, which are *not* limited to police, paramilitary or military forces.

Some of the most decisive security assets historically have been demographic, economic, and social, although they may be ignored by traditional security intelligence services. Large populations can be an asset and a liability. Turkey and Morocco have used supported migration to claim territory.

Commercial companies like the French Ottoman Company, the Dutch East India Company, or Cecil Rhode's operations in South Africa illustrate the power of state-backed corporations.

2.4.3 Resilience Factors

Factors contributing to resilience of sub-systems are an important part of systemic resilience. Homogeneity and diversity can help withstand shocks. Homogeneity implies that parts of a system are interchangeable, while diversity implies that sub-systems have differential vulnerabilities. Homogeneous populations like Japan's might respond more cohesively to a disaster, while diverse populations like Canada's might generate more variegated responses. Effective communication between groups, across generations, and between government and populations is an intervening variable influencing resilience.

An accurate worldview is critical in shaping an appropriate response to shocks. This involves eschewing "magical thinking" based on irrational or unscientific narratives about causal relations. Such beliefs often serve institutional interests, and may be stabilizing or comforting, while their antitheses may be inconvenient and disruptive, but necessary. Worldviews about security, energy, health, social relations and the environment are important to get right, but this involves a series of incremental steps, which may be impossible to evaluate until long after an event or decision-point. Nevertheless, governments that critically examine concepts—such as deterrence, climate change, peak oil, and environmental pressure—have a better chance to develop sound policy responses than those that deny imperfect evidence of emerging trends.

2.5 Externalities

An externality is an effect whose benefit or cost to a third party is not reflected in the market price of a good or service (Dictionary of Economics). Corporations are the most effective means available for externalizing costs and internalizing or privatizing profits, and corporations and states produce large-scale externalities (Kang, 2009). Pollution, for example, is a cost of many human activities that is not incorporated in most market pricing, so it tends to be borne by others or by future generations.

Environmental damage from human activity is an externality. Religion, ideology, and social change may be based on conflicting narratives of justice, good and evil, starting out well but having unforeseen consequences. War, migration, trade, new technology, and dislocation interact with epidemic disease to exacerbate vulnerability.

Famine, war, and disease may also present opportunities. The natural environment can support a certain population with available technology, and beyond that, the population's demands begin to erode the ability of land, water, and soil to continue to support it. War against neighbours is an historical response (Feierabend and Feierabend, 1969; Adler-Karlson, 1974; Choucri and North, 1975).

The power of small groups and the interacting phenomena of speed and connectivity arise from transport and communications technology, social dependence on complex systems, and the availability of weapons of mass destruction (Homer-Dixon, 2008). The need for mass distraction also rewards governments for focusing on small groups rather than large and uncontrollable processes for which all of us are in some ways responsible.

Table 1 Examples of Potential Stress Indicators

| | | |
|-------------------|---------------------------------------|---|
| Foundations | Air, water, soil, environment | Change in precipitation, water tables or flow rates Annual temperature changes, Pollution levels, purification costs, litres per day per person flow rates, toxicity indicators |
| | Energy | Energy affects all providers, and often reveals other major vulnerabilities; Sources of energy, security of sources, stockpiles, alternatives (peak oil); Changing technology for production or use of energy |
| Providers | Food & water | Sustainable local production as proportion of total consumption |
| | Health & social security | Chronic and acute health care facilities; family support networks; alternatives to family support; neighbourhood and community-level planning |
| | Culture, education | Literacy rates; prevalence/availability of essential information; robustness of information sources; problems of magical thinking |
| | Transport, communication | Average commuter distance; weight of goods multiplied by distance of imports to a city or region; reliance on communications media; concentration in media ownership; concentration of information sources, reliability, validity, distraction |
| | Markets, finance | Confidence measures (over time); market semiotics (Dorsey, 2003); debt and deficit levels over time as proportion of productivity or income levels, for individuals, governments, companies |
| | Policing, security | Patterns of security force providers: service, self-service, and predation; loyalty and cohesion indicators for uniformed services; network analysis of key leaders controlling security assets; corruption indicators; public trust indicators; ethnic frictions and factions within security services; regional differences |
| Governance | | Is government capable of preparing long range plans, mobilizing resources, and responding to short- and medium-term crises? Are leaders able to create the conditions for synergy amongst providers and enablers? Does governance provide accurate and timely policy responses? Is governance free to plan and pre-empt disaster? |
| Enablers | Ingenuity | Patent production rate; culture of invention, innovation |
| | Security | Domestic security, crime rates, violent crime rates; arms races, border threats, mechanisms to manage interstate dispute; prevalence of armed non-state actors |
| | Resilience | Internal social tensions and divisions; common purpose expressed in public events |
| Externalities | Narratives (religion, ideology, etc.) | What stories reinforce or undermine social cohesion? Is the prevalence of these stories increasing or declining? What stories support violent responses or resistance? |
| | Armed conflict | What is the distribution and intensity of motivation and capability to engage in armed conflict, by states and non-state actors? |
| | Environmental change | Change in precipitation, water tables or flow rates Annual temperature changes, Pollution levels, purification costs, litres per day per person flow rates, toxicity indicators |
| | Policy responses | Are policy responses timely and effective? Is adequate quality information gathered to permit good governance? Do policy responses cause deterioration? |

3. Conclusion and Further Discussion

Table 1 compiles examples of indicators that might help planners consider the implications of the framework. For example, planners in a community dependent upon imports for a large share of its food supply might consider the implications of sudden increases in energy costs, or crop failures in major suppliers. The model can be used to explore deductions about the consequences over time for many parts society. While military or police officers may say, "that's not my job," they are forced to reconsider if they see themselves as professionals responsible for human and national security. The value of the model lies in helping think through consequences and connections.

Resilience is the ability to withstand shocks or stresses. These can take many forms, and successful societies are able to prepare and mitigate, but also manage consequences, which might be unforeseen.

Security institutions like military and police provide societies' forces of last resort, and are therefore in the front ranks when it comes to planning and preparing.

The aim of the framework presented here is to provide a tool to help policy makers put into place the information and awareness of interconnections that will help them to respond to shocks and stresses affecting security. Governance is at the centre of the framework; governance depends partly upon accurate and timely information, including awareness of foundations and externalities that have a long time-horizon, as well as the interaction of enablers and providers, on a short time-scale.

Planning for resilience is a vital part of meeting community needs for human security and states' needs for national security. Planning is always a team sport, demanding a common awareness of the field on which the goal is to be pursued. This framework fills a gap in models for planning and awareness, and is suitable for command and staff colleges, national planning cells, and discussion for collaborative response to complex challenges.

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