*Summary*

# Forging Resilience Symposium:

## Defining Next Steps and Building on Initial Gains

One hundred international aid professionals discussed their efforts to **measure resilience** in their programs at this all-day, symposium, the largest and most diverse of its kind. Topics spanned the many ways donors and implementers view the paradigm of "Resilience" as a goal of foreign assistance, cutting across both development and humanitarian assistance arenas. The symposium followed Chatham House Rules meaning statements or quotes are not attributed to any individuals.

Participants sat around one large table and came from fifty-five agencies: a wide range of NGOs, USAID and State Department Bureaus, contracting firms, the U.N. and universities, all speaking candidly.

The Symposium was hosted by American University's School of International Service, in Washington, DC. And planned hosted collaboratively by a range of groups. International Business & Technical Consultants, Inc. (IBTCI)[1], Management Systems International are specialists in measurement and emergencies. The American Red Cross hosted as a leader in disaster mitigation. A critical host was the Resilience Learning Consortium, comprised of CARE, Catholic Relief Services, Mercy Corps and World Vision are operational promoting resilience in a range of humanitarian programs in 100 countries. This event recapped the Woodrow Wilson Center's "Next Generation Resilience" roundtable held by the Resilience Learning Consortium in December 2013.

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MSI MANAGEMENT SYSTEMS INTERNATIONAL

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In the opening, the moderator explained that the challenge before the participants is to find a common approach **to recognize and measure resilience**. If resilience is the goal of so many programs and projects**, how do we know whether and when it is achieved**? What does the outcome look like? Six sessions framed the day's discussions, with facilitators drawn from Inter*Action,* USAID, and sponsoring

[1] IBTCI managed the logistics, catering, invitations and background materials. The Symposium was moderated and rapporteur'd by IBTCI's resilience specialist, Steven Hansch.

organizations, IBTCI, American University, World Vision, Mercy Corps, Catholic Relief Services, the American Red Cross, the Wilson Center, and Management Systems International.

The symposium reviewed the resilience movement in foreign aid over recent years. It discussed the role of resilience in bridging the divide between humanitarian assistance and development assistance; and deliberated the imperatives for and challenges in institutionalizing and operationalizing resilience, especially in conflict and fragile areas. Session moderators included the Presidents of InterAction (the NGO association), Jeremy Konyndyk (head of the Office of US Foreign Disaster Assistance), and Anita Menghetti from the Department of State.

Participants spoke to the importance of taking resilience beyond being just a popular buzzword. Indeed, resilience may challenge the status-quo for project designs and current indicators. Most participants entered the meeting frustrated at the aid community's collective inability to define resilience clearly, to measure it reliably, to pinpoint which sectors it applies to and exactly how – despite the rhetoric -- resilience programming can bridge the different sectoral silos that currently limit breakthroughs in aid, characterized for instance by the disaster programmers doing their thing independently of the development practitioners. One common working definition has been that *"Resilience to stressors is adaptation over time."*

*The term resilience has been mocked as a buzzword that is being used to repackage programs that should be run more effectively. The aim of these events is to build a dialogue between different agencies, academics, and practitioners to debate what is different about it, discuss ways to support resilience in communities, and conceptualize how it can be measured.*

In recent years, most donors have adopted resilience agendas, such as the World Bank, UNDP, the British government and the European Union. There is an inter-agency working group with IFPRI spearheading indicators to measure resilience. Nevertheless, USAID is struggling with mainstreaming resilience and not having it just be in one office. And there are over 40 different resilience frameworks among NGOs, and yet more among donors. "In the recent OECD paper about measuring resilience which struggles to separate risks -- is like *stuffing jellyfish into pigeonholes*. It is messy and not that helpful."

Similar to a previous paradigm – Integrated Rural Development – there is a temptation now to just add everything into resilience, without being solution oriented. One discussant felt that there is now a "convergence of people with shared experience" that will provide a lens for building these bridges.

*Examples of measures of resilience include:*
- *Community self-organizing;*
- *Diversification of income sources in a community;*
- *Trust and sharing in times of shock;*
- *Redundant safety nets;*
- *Acute malnutrition among children;*
- *Household assets;*
- *Avoidance of violent conflict;*
- *Capacity for collective action; and*
- *Sustainability of infrastructure interventions.*

**Resilience and Risk Reduction:** The new emphasis on resilience represents an alternate take on the promotion of "risk reduction" as a goal for aid. Resilience can be viewed as development work with a risk lens in order to lessen the effects of shock, essentially risk-focused development. In discussing how to bridge the "Humanitarian-development divide", disaster risk reduction (DRR) can be a useful point of entry but needs to be thought of beforehand, i.e. before a shock or hazard. Too often, though, DDR gets lost in the urgency for humanitarian assistance. A resilience perspective may provide the necessary framework to accomplish what the language around DRR has failed to accomplish. Catholic Relief

Services programs are suggestive of adopting a disaster preparedness lens for all development programming.

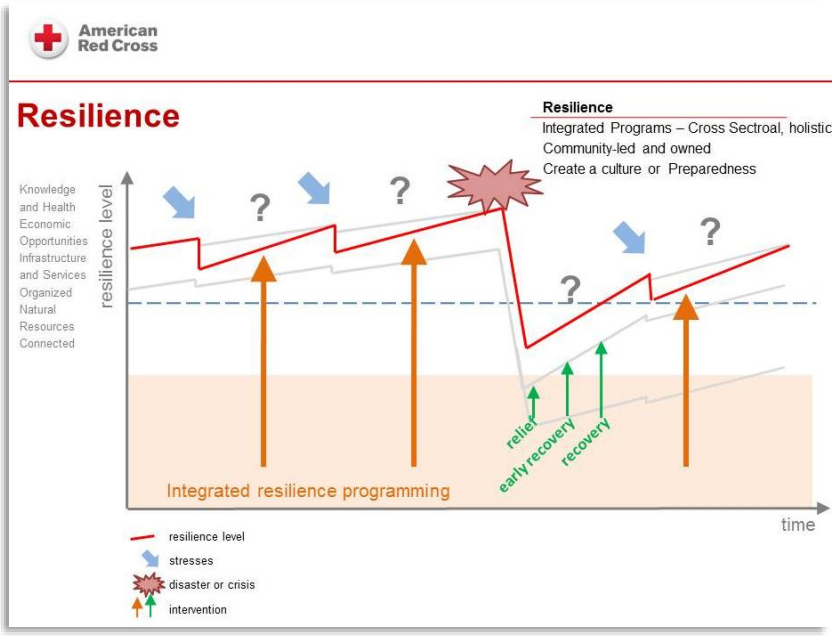
Drawing on the case of Typhoon Haiyan ("Yolanda"), speakers spoke of the lessons repairing commercial markets and value chains to efficiently bolster resilience in a crisis. The value chain perspective is about allocating resources where they can leverage innate market processes. The Office of US Foreign Disaster Assistance (OFDA) prioritizes resilience as a goal, best achieved through integration with local capacities. Other emergency donors are testing new funding mechanisms and they are also intrigued by resilience.

*What do you do when you can either build one typhoon-resistant house, or 10 semi-resistant houses?*

**"Overcoming collective paralysis"**

The Symposia examined experiences from different countries' 'transition' from vulnerability to resilience, for instance in Yemen, Nepal, South Sudan, Philippines, Somalia, and Honduras. The US Government has an inter-agency process that has identified 10 relief-to-development countries that are tagged as transitional countries for the 2016 budget. The USG is asking these ten USAID missions what programming they plan to benefit the populations transitioning from humanitarian aid to development. Pilot programs may prove to the Congress that a resilient transition is more than a fad and should be incorporated into the post-2015 global agenda. Within USAID, the recent Joint Planning Cells (JPCs) for resilience have been tested in the Sahel and in East Africa.

The American Red Cross established the Global Disaster Preparedness Center which framed this resilience diagram (at right) about shocks and programming.




In Kenya, a multi-donor (including USAID) joint baseline was created for all investment with 186 different organizations coming together to work on resilience, with Kenya government buy-in. Are donors building the incentives for implementing agencies to cooperate through coalitions, with shared goals and analyses?

Both donors and NGOs favor a resilience learning agenda. *"The resilience agenda should not be top-down but rather bottom-up, building on local knowledge and capacity. We have to know how people cope by finding who they rely on when they face shocks or stress."* DFID has a different understanding of disaster resilience, leveraging humanitarian footprint to fundamentally development problem.

Achieving resilience requires a merger among worldviews. The humanitarian approach views a great many aspects of development as "externalities" (conflict, governance, human rights, markets, etc.). Instead, these issues must be hard-wired into integrated program design with resilience as an outcome.

Resilience was suggested as being associated with the density of International NGOs in an area. Which led to the suggestion that NGOs need to learn to "get out of the way" of a community's natural coping

mechanisms, or, ironically, “don’t just do something, stand there and look around.” Similarly, concerns were expressed about the tendency of NGOs to displace the commercial (or local private sector), and not using market players effectively.

Urban disasters were discussed in terms of the need for NGOs to examine structural or architectural vulnerabilities and bring these to donors, which is not currently being done. We need to engage with the commercial insurance sector by reducing costs of payout. In disaster preparedness we need to plan for staging areas, and need evacuation plans. There is a lack of incorporating resilience in logistics.

**Institutions and Resilience:** Within USAID, the resilience agenda has been advanced by individuals; it has not yet been institutionalized. The challenges in institutionalizing resilience lie in the cross-sectoral nature of the concept. Much like gender, the resilience can be strengthened in sectors such as climate change, health, water, family planning, food security, democracy and governance, economic growth, and others. Humanitarian aid focuses greatly on short-term emergency relief funding, and these funding structures do not adequately allow for implementers to address resilience. There are few steady streams of support over a longer term which is necessary to engage vulnerable populations on a much larger scale. In addition to the changes within USAID, other USG entities must address this issue in their programming. Increased inter-agency conversations about resilience building will reinforce the concept. For example, joint USAID and State Department programming and analysis can start bringing in other actors and should provide leadership to talk about general partnerships with youth, women, and religious leaders to have a resilience agenda.

Can resilience be thought of as state- building? While it may be crucial, we have insufficient models to track this. Perhaps we resilience is closely allied to peace-building?

We need incentives to promote resilience. Currently, NGOs are rewarded by donations for emergency response, not for resilience or prevention of risks. Attention was called to the recent models by USAID’s Food for Peace program in reworking incentives and structural approaches to programming.

*Resilience planning requires a different type of analysis. Instead of merely asking what communities need, ask why they need it.*

**Operationalizing Resilience**: Some basic ways in which donor agencies have been operationalizing resilience has been via building resilience in job descriptions, holding people responsible, and incorporating resilience into written work plans. Food for Peace may serve as a model for how they have reworked incentives and structural issues with programming. The World Food Program’s work in Ethiopia was also cited with its blending of resilience, micro-insurance and disaster risk reduction.

Several examples of resilience-building field programs were mentioned, combining savings programs, microcredit, small-enterprise, risk-transfer via insurance, health, and value chains. Vulnerable populations should be linked to markets, and achieving this through local associations has proven to be successful. In Burundi, female-headed households were integrated into farmers associations, which have enabled the women to reach markets they otherwise would not have. Inclusive associations with regular rotation of leadership to include more women in leadership have mitigated risks to this

vulnerable population and increased their resiliency to shocks. These associations are an example of community-level safety nets. These associations can give people choices and tools with which to improve resilience. One of the main missing links is access to finance. Seed banks have helped enhance commercial linkages with the private sector. For example, the SEEP (small enterprise) Network aims to promote inclusive markets and financial systems through market-based and transfer-based approaches.

> *"Our ability to conceptualize resilience is getting ahead of our ability to manage it. We need to answer what resilience means at the community level, national level, donor level, and international level. Concrete notions at the field level and operationalizing resilience and to develop a resilience discipline."*

As we attempt to scale up resilience, it is also important to remember context and keep in mind specific vulnerable communities such as **disabled** populations, who are ignored, uncounted and underestimated in size (typically 20% of people in developing countries), and consists of the elderly, psychosocially disabled, and physically handicapped. *"Individuals with disabilities are one of the most vulnerable populations—it is imperative to overcome stigma to achieve resilience."*

Many spoke of the use of a "systems approach," as used in the science of ecology, to pinpoint what's "new" about resilience.

**Conflict and Resilience**: There are conflicting theories on the role of resilience in conflict areas, an under-researched topic. We need a better understanding of political shocks, effects of conflict on displacement, how development and security interventions interact, and the commonalities between conflict and natural hazards in order to gain a better understanding of a resilience model so that these concepts can be applied to with a predictive theoretical framework. In Afghanistan, for example, the normal state of affairs has become violent conflict where people are forced to adapt and migrate. *"Perceptions, along with morale, are key for people to be more resilient in conflict."*

*"Resilience is not necessarily benign in a conflict setting, short term solutions to mitigate conflict in the short run can ruin resilience in the long run."* It is impossible to have a discussion on conflict and fragile states without a discussion of forced migration. Displaced people face additional restraints which others do not. Urban refugees, for example, operate within a rigid system and depend on the infrastructures.

> *"We need more systems thinking. Humanitarian organizations are too hard-wired into treating governance, markets, conflict and human rights as externalities. Instead, we need to integrate them into our programming"*

**Measuring Resilience:** Resilience is larger than the sum of its parts, so measuring it is difficult. Measuring resilience often requires observing participatory processes. So, is resilience a process? If not, in an M&E sense, what is the resilient outcome of the process? If you cannot assess the impact of what you are doing, then there is a really big question mark about what you are doing. *"In the end, we want to see resilience manifest itself in terms of some development outcome."* There are so many

definitions of resilience, based on sustainability, stability, bouncing back, well-being diversity, systems, etc. Attempts are being made to make a more concrete definition of resilience for the purposes of measurement and conducting impact evaluations. *"We are making progress toward an agreed upon set of metrics."* But if defining resilience in terms of "resilience to shocks," then how can we measure resilience in the absence of a shock to test the community?

The international "Technical working group on resilience and measurement" is exploring whether there are distinct sets of indicators of resilience. So far there are none; but, there are sets of variables and factors that should be set in place to see if and where there is resilience. For both quantitative and qualitative inquiry, especially in household surveys, it is important to have evidence-based scientific data, more common in biological and environmental sciences. Monitoring and evaluation specialists seek to winnow down the defining indicators, where less is more (i.e. better).

Inter-agency groups are identifying these factors as intrinsic to resilience: 1) the **absorptive** capacity of a community; its coping mechanism in the wake of a shock; and early warning systems; 2) **adaptive** capacity, including access to credit, gender empowerment; and, 3) **transformative** capacity: the ability to move back to a place state than before. *"Our industry's goal should not be just returning back to the same conditions as before, but reducing risks into the future."*

It is becoming essential to define and measure resilience at multiple **scales**. Measuring resilience will require experts to recognize and assess **sequencing, layering and integration in** ways that are implied in many NGO program designs and theories of change, but rarely evaluated.

*How do we look beyond households and view communities as a single unit?*

While much of the early program work focused on **household resilience**, now the shift is toward measuring resilience at the **project level** and at the community or **social level**, which raises issues of measuring a community's capacity for collective action. What roles exist for social capital and social cohesion in achieving resilience results? Focus Group Discussions may be critical to understanding perceptions and community-level dynamics.

During the symposium numerous speakers discussed the Sahel region where relief is repeatedly needed because of shortfalls in development, the Philippines which is episodically hit by typhoons, Ethiopia where NGOs have banded together in consortia, Somalia, Yemen, Haiti, the Democratic Republic of Congo, the Middle East, and fragile states.

There are no single metrics. There is a need for evaluations to tell us what resilience is and what works. So far -- *"Resilience has been episodic and serendipitous through extraordinary people in missions."*

**Next Steps -- Questions for the Resilience Learning Agenda:**

- How do we engage with different levels of host governments on their role in resilience?
- Our goal is to learn to co-invest and act at multiple levels and a facilitation rather than implementation role
- How do we diversify the funding opportunities for programming for resilience?
- Can we model resilience with system dynamics, delays and feedback loops?
- How do we bring urban populations into the resilience agenda, understanding their dependencies and coping patterns?
- How do we further incorporate the for-profit sector, private investors and market integration into our resilience programming?
- How can we foster more forums to learn from one another about evidence related to resilience?

Dedicated to Professor David Hirschmann

# Symposium Agenda

# Forging Resilience: Defining Next Steps and Building on Initial Gains

## February 25, 2014
## Butler Board Room, American University, Washington, DC

This inter-disciplinary symposium built upon the "Next Generation Resilience" roundtable in December 2013 and continues the momentum for a series of meetings among practitioners, funders, evaluators, sociologists and creative thinkers to share how assistance programs achieve the goal of building resilience. Participants will compare and explore field approaches about how to operationalize resilience-building. Key themes will include how to overcome the long-standing divide between humanitarian and development approaches and how to recognize and measure resilience, with an eye toward "what's really new." Organized by IBTCI and American University, this symposium brought together new ideas, program designs and ideas about best practices in resilience. Topics to be discussed include:

### Next Steps in a Learning Agenda

Building on the Woodrow Wilson Center - World Vision roundtable, "*Next Generation Resilience*", looking to find balance between conceptualizing and managing resilience in project activities.

How do we bridge the development – humanitarian divide? What are good examples across sectors of integration, layering and sequencing together? How are agencies working to find new ways of decision making between relief and development teams?

### Who is Funding or Piloting Innovations in Resilience?

Which donors are scaling up support for resilience? How can the various resilience learning alliances enrich one another, for instance in knowledge management and evaluation of resilience? What field initiatives or integrated programs promising resilience are really new?

### Resilience in the context of Conflict-affected Areas and Fragile States

Managing the transition from vulnerability to resilience in Yemen, Nepal, South Sudan, Philippines, Somalia, Honduras, and other areas?

Mainstreaming conflict sensitivity & social assessment of resilience in conflict-affected fragile states.

### Theories of Change: Recognizing Resilience as well as its Absence

Measuring resilience as an impact: How do we recognize a community's progress in increasing its resilience, in the absence of a disaster? What are the assumptions or theories about prerequisites before resilience can occur? What roles exist for social capital and social cohesion in achieving resilience results?

What can the primary health care community, ecologists, sociologists and psychologists teach one another about measuring patterns of resilience in systems?

## Organizations Participating

ACDI/VOCA

AECOM

American Red Cross

American Refugee Committee

American University -- School of International Service (SIS)

CARE

Catholic Relief Services

ChildFund

Development Alternatives Inc, (DAI)

Earth Institute of Columbia University

EnterpriseWorks

Global Alliance for Improved Nutrition (GAIN)

Global Communities (CHF)

International Business &Technical Consultants, Inc. (IBTCI)

Inter*Action*

International Food Policy Research Institute

International Medical Corps

John Snow International

Konterra Group

MacFadden Group

Management Systems International

Mercy Corps

Microfinance Opportunities

Millennium Water Alliance

Oxfam

PACT

Pew Charitable Trusts

Physicians for Human Rights

Save the Children

Search for Common Ground

SEEP small enterprise network

Society for International Development

Takoma Evaluation and Research

TANGO

US Agency for International Development

US Department of Homeland Security - FEMA

U.S. Department of State

U.S. Department of Agriculture

Virginia Polytechnic University, Advanced Research Institute

Wilson Center

World Food Programme

World Vision

**The American University Campus**

**Historic Importance**

The Forging Resilience Symposium carries forward the discussion held 200 feet away at John F Kennedy's important summer 1963 speech, not long before he was killed, promoting a vision of peace:

*"There is no single, simple key to this peace -- no grand or magic formula to be adopted by one or two powers. Genuine peace must be the product of many nations, the sum of many acts. It must be dynamic, not static, changing to meet the challenge of each new generation. For peace is a process -- a way of solving problems. With such a peace, there will still be quarrels and conflicting interests, as there are within families and nations. World peace, like community peace, does not require that each man love his neighbor -- it requires only that they live together with mutual tolerance, submitting their disputes to a just and peaceful settlement. And history teaches us that enmities between nations, as between individuals, do not last forever. However fixed our likes and dislikes may seem, the tide of time and events will often bring surprising changes in the relations between nations and neighbors."*


Six years before that, President Dwight D Eisenhower supported the creation of the AU School of International Service (SIS), the largest such school in America and led its groundbreaking. Recently, the School completed a new SIS building, shown below,

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# Selecting Readings for the Participants of the February 25, 2014 Symposium,

# *Forging Resilience*

## at American University

AMERICAN UNIVERSITY
WASHINGTON, DC


American Red Cross



# Introduction[1]

Following are materials and thoughts about resilience recommended or prepared by those participating in this series of roundtables about resilience.

This symposium builds primarily on the Roundtable organized by the Woodrow Wilson Center and World Vision "Next Generation Resilience." A summary of that meeting is found on the following three pages.

USAID has convened many meetings on its resilience strategy including a large donor gathering in June 2012 and other internal meetings including one earlier this month in Senegal. IFPRI is hosting what may be the most important next meeting, in May 2014, in Addis Ababa, Ethiopia.

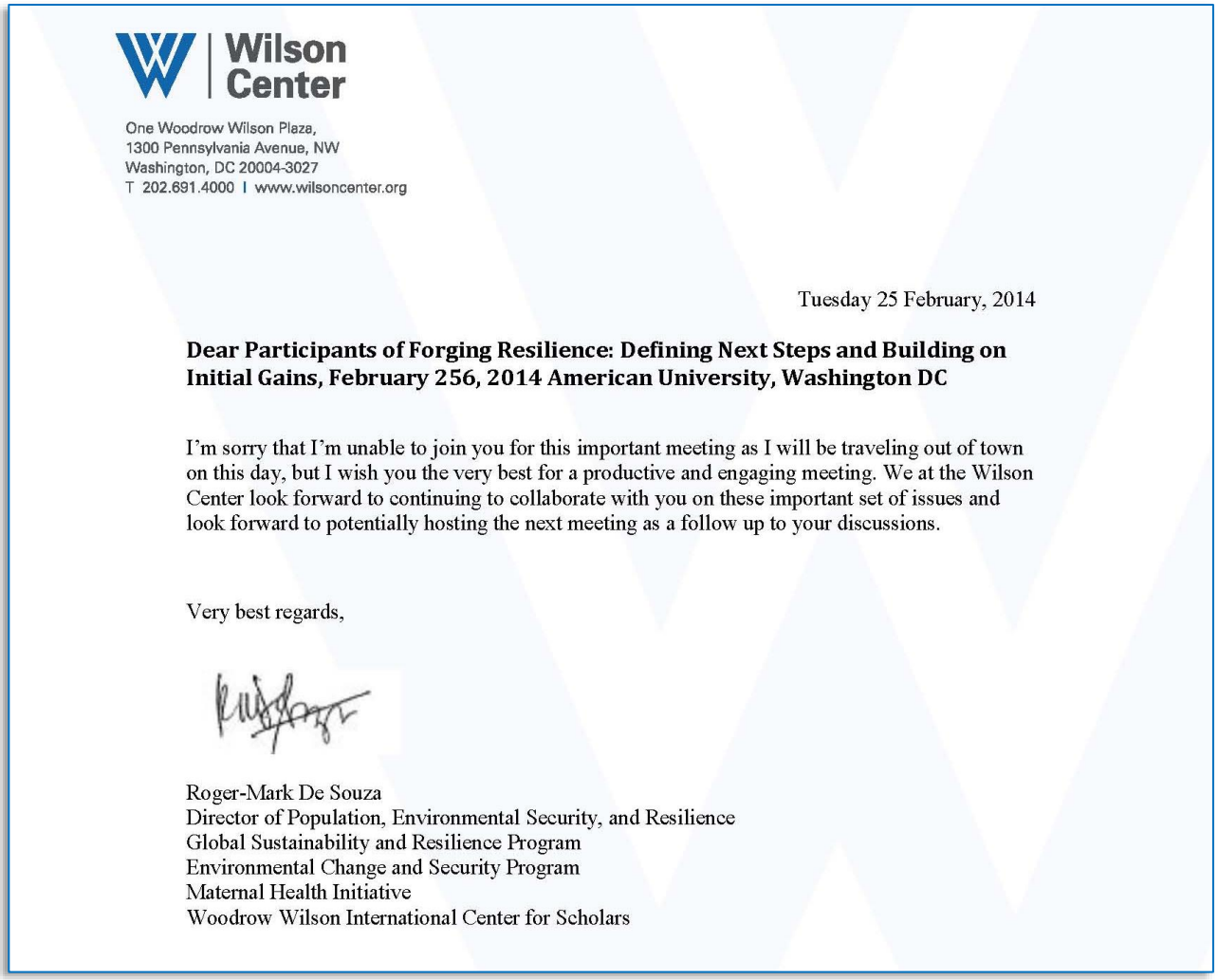
The NGO and practitioner community has also held a wide range of meetings including a CARE/Oxfam gathering last summer, and retreats by CARE and CRS this Fall. At the International Humanitarian Studies Association meetings in Istanbul, October, 2013, there were a series of panels about resilience which noted the high prominence it has for both European Commission's Humanitarian Office (ECHO) and the European Commission's development program.

DFID has also begun to frame much of its policy and goals around resilience. An Overseas Development Institute meeting on resilience is also included here, after the World Vision/Woodrow Wilson meeting Summary.

The current symposium was organized as an opportunity for different agencies to share their progress in institutionalizing and operationalizing resilience, compare notes about outstanding questions, and brainstorm how resilience will be measured. A core question is what about resilience is new or different. The related question is whether honing the implications of resilience may lead to a more powerful, effective paradigm of foreign assistance in the future. There will be future roundtables and meetings. IFPRI is hosting a major gathering that will look at resilience from May 15 – 17, 2014. See: http://www.ifpri.org/event/building-resilience-food-and-nutrition-security.

Future Washington DC roundtables are envisioned to bring together, successively: foundations, private corporations, evaluators, Asia specialists, and health program planners, at rotating venues with different hosts, but with a core cadre of committed resilience learners.

[1] Collated and prepared by Steven Hansch



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Tuesday 25 February, 2014

**Dear Participants of Forging Resilience: Defining Next Steps and Building on Initial Gains, February 256, 2014 American University, Washington DC**

I'm sorry that I'm unable to join you for this important meeting as I will be traveling out of town on this day, but I wish you the very best for a productive and engaging meeting. We at the Wilson Center look forward to continuing to collaborate with you on these important set of issues and look forward to potentially hosting the next meeting as a follow up to your discussions.

Very best regards,

Roger-Mark De Souza
Director of Population, Environmental Security, and Resilience
Global Sustainability and Resilience Program
Environmental Change and Security Program
Maternal Health Initiative
Woodrow Wilson International Center for Scholars

Then, in May: The CGIAR Consortium and IFPRI are hosting a "2020" conference "***Building Resilience for Food and Nutrition Security":*** **May 15-17, 2014 in Addis Ababa**, Ethiopia, will bring together policymakers, practitioners, and scholars to discuss how resilience can be strengthened for food and nutrition security. The conference will:

- ✓ Articulate an intellectual framework for resilience;
- ✓ Identify key emerging shocks that pose the biggest threats to food and nutrition security, where resilience needs to be significantly strengthened;
- ✓ Assess experiences through case studies and draw out lessons from programs, policies, institutions, and investments around the world;
- ✓ Identify key approaches and tools to build resilience to shocks;
- ✓ Set priorities for action by different actors and in different regions; and
- ✓ Identify knowledge and action gaps in research, policy, and programming that need to be met or scaled up in order to successfully build resilience to food and nutrition insecurity.
- ✓ Conferees will represent food and nutrition security, agriculture, humanitarian, and related development sectors as well as actors from government, the private sector, nongovernmental organizations, donors, and academia.

The conference website is at: http://www.2020resilience.ifpri.info/

There will be a knowledge fair, resources available, many sessions.

**RECAP of the World Vision – Wilson Center Resilience Roundtable, December 2013**
*65 participants, Nancy Lindborg keynoting*

*"How do we factor in resilience with system change, especially in systems that need to change?" the Wilson Center's Blair Ruble asked an audience of sustainability and development practitioners convened by World Vision at the Center last December. "Particularly, if a system is not addressing the issue of income inequality, how do you make that system resilient, but still break out of that inequality?"*

**Event Summary**
World Vision and the Wilson Center co-convened a round-table dialogue on how the concept and implantation of resilience has evolved since the publication of USAID's Policy and Program Guidance on Resilience one year ago. The discussion was guided by three major themes: incorporating resilience into program design, evaluating the impact of resilience, and integrating the concept across sectors.

**Recurring Themes**
Systems: Approaching resilience through a systems-thinking lens has a great deal of utility. Understanding the system will guide how practitioners layer and sequence programming, identify aspects of the system that promote growth or perpetuate poverty, and enable implementers to place the components of resilience within the larger context.

**Context**: Adapting resilience programs to fit within their context is the intended consequence of systems thinking. Doing so allows us to plan for interaction between the various pieces, identify the opportunities that are available, and prepare for challenges that impede progress. Resilience is likely to look very different across diverse contexts – both in terms of who is resilient to what and in terms of the type of enabling (or disabling) environment that is present.

**Conflict and Fragility**: Resilience in fragile and conflict-afflicted contexts has been consistently identified as a gap in theory and programming. Successful resilience programming in these contexts will likely to prove both the most difficult to implement and the most valuable for growth. Without a means of retaining progress on development, programs will be ultimately ineffective – resilience may provide that means.

**Conceptualization:** We have the capacity to develop sophisticated conceptual frameworks for resilience, but potentially end up with little capacity to manage them. In other words, how do we operationalize the change in reality that we see and want, including a better coordination of sector-specific interventions?

**Drought Response Teaches Lessons**
One key to improving community and country systems for disaster risk reduction is effective, contextualized post-mortem assessments of past resilience efforts, said a panelist. World Vision staffers said there are two major questions to ask when approaching any resilience initiative: "Whose resilience are we talking about? And resilience to what?" Efforts in the Horn of Africa, for example, have gained significant traction by working with smallholder farmers to diversify crops and plant drought tolerant, disease resistant seeds. Weather patterns in the region have become increasingly

variable, with fluctuating rainfall levels, more frequent drought, and shifting seasonal patterns. Smallholder farmers and pastoralists in the region are often too poor to withstand the resulting extremes (drought and flooding are among the main killers in the region).

World Vision and others have asked how they could strengthen these farmers' livelihoods in a way that creates a more sustainable system for future generations. As in the Horn response, after two years of programing to recover from the 2012 Sahel drought, aid groups are probing for the best indicators of resilience to poverty and hunger at the household level. Three aid groups in a recent study in West Africa concluded that part of the answer is more coordinated action to address a general "resilience deficit."

**A Surge Protector**

The experience has sparked conversations on increasing clarity about what "resilience" means, in order to ensure mutual understanding – between donors, partners, implementers, and affected communities – of a project's scope and goals. For some, there are still concerns that the greater policymaking community has yet to develop and agree on metrics that can accurately portray complex systems and intervention impacts.

One attendee asked how NGOs incorporate social capital variables of and the linked or independent nature of various livelihood sources into their assessments. Multiple attendees pointed out that drivers of vulnerability aren't occurring in a political vacuum from disaster intervention, but rather they reflect social inequities that create vulnerabilities in the first place. A failure to incorporate social dynamics and political infrastructures in resilience planning all but ensures a program will end up bolstering the stability of harmful or unjust systems. As one panelist observed, many adaptation policies have resulted in conflict – so how do you ensure resilience programming takes conflict mitigation and "do no harm" into account in order to have a positive impact?

In Kenya and Ethiopia, World Vision and other NGOs have attempted to incorporate social survey evidence into their baseline surveys. "Oftentimes, social capital is measured by participation in organizations," one panelist said: "But to ask the very frank question: were you able to lean on others during the last drought? Will you be able to lean on others during the next drought? That might strike some of us as odd, as how would you know? But a pastoralist sitting in northeastern Kenya knows, they know whether they're part of a reciprocal obligation network, or whether they're out of that network.

*"We Must Understand the Shocks and Stressors"*

By incorporating preliminary vulnerability analyses into development strategies, it is possible to target specific variables that might prevent community adaptation and growth. However, there is little agreement on universal indicators for social, economic, political, or environmental dynamics that may affect resilience.

Participants did agree on some of the right questions to ask: How does thinking in terms of systems change what NGOs actually do? In operational terms, what's the best way to better coordinate across sectors? How can existing resilience programs be scaled up while maintaining important contextual differences between places and communities?

Unfortunately, there are no fail-safe answers to these questions yet, but the collaborative discussion found policymakers uncovering multiple social vulnerability indicators to consider in interventions

that seek to not only build back but prevent the next disaster. A pivotal aspect in this planning is understanding demographic and community data as reflective of where people are most vulnerable in their own value systems.

## Other Selected Remarks

"There is no "magic bullet" for resilience"

"Systems that perpetuate deep poverty cannot be resilient"

"Continuing the trend from service delivery to facilitation is challenging but worthwhile"

"Building resilience means building absorptive and adaptive capacity. Absorptive capacity builds buffers against shocks; adaptive capacity speeds community's recovery time."

"Poverty constrains the options available to families during shocks"

"The true impact of resilience might extend beyond the few indicators used to measure specific outcomes"

"The unit of analysis for resilience should be the social network rather than the household – a key question is "were you able to (or will you be able to) rely on others?"

"The role of idiosyncratic shocks (disease, death, loss of assets) is overlooked"

"How can we build on existing programs and integrate them into governance and social systems?"

"Identifying the necessary conditions of resilience is essential. If even one is absent, a resilient outcome will not obtain."

"Shifting to a longer time-scale mentality will be necessary to observe results in resilience"

"There's an absence of knowledge on how power, mistreatment, and social context impact resilience"

"The link between relief and development has not been identified. Where does the transition start, and how?"

"In a poor/non-poor, resilient/non-resilient 2x2, what is the outcome that we want (presuming scarce resources)"

## Questions to Carry Forward for the continuing dialogue

1. **How does thinking in terms of systems change what we actually do?**
2. **In operational terms, how can we better coordinate across sectors?**
3. **How can we scale up existing resilience programs when context is essential?**
4. **How can resilience to idiosyncratic shocks be operationalized and scaled?**

**5. How and when do we transition from relief to development?**

---

**IBTCI** participated in a series of panel sessions on resilience On October 25, 2013 at the International Humanitarian Studies Association Conference, in Istanbul Turkey. IBTCI also worked with USAID, MSI and American University to organize a brainstorming session on resilience at the annual gathering of nationwide aid analysts at the Development Management Network.

**American University** also has had increasing involvement in Resilience, which has become a part of graduate courses, and a student practicum this semester and field research. AU hosted a panel on resilience and foreign assistance at the annual Development Management Network meeting in November, 2013. And American University showcased a discussion on resilience at its annual, large, development studies, alumni dinner, December 12, 2013, where many alumni across the industry spoke about their agencies involvement in resilience.

## Bridging the Relief to Development Divide

USAID has cast resilience as a goal step to reduce expensive humanitarian relief after the fact. Hence, discussions about resilience frequently dovetail to an older question of how the communities of humanitarian and development professionals can work together better, starting with talking to one another, about how to pursue developmental programs as well as relief and recovery programs in a manner that build resilience in societies so that future hazards will not necessitate external relief.

This is a long-term conundrum for the aid community, and a recurring centerpiece of efforts, such as the relief-to-development continuum work in the Greater Horn of Africa Initiative of the 1990s.

In recent months, USAID has established a series of new initiatives, including the new RISE initiative announced this month for the Sahel, along with the REGIS, REGAL and Sarel programs.

Participants will discuss “How do we assist in making displaced populations more resilient, particularly in situations where return to their places of origin are from imminent?

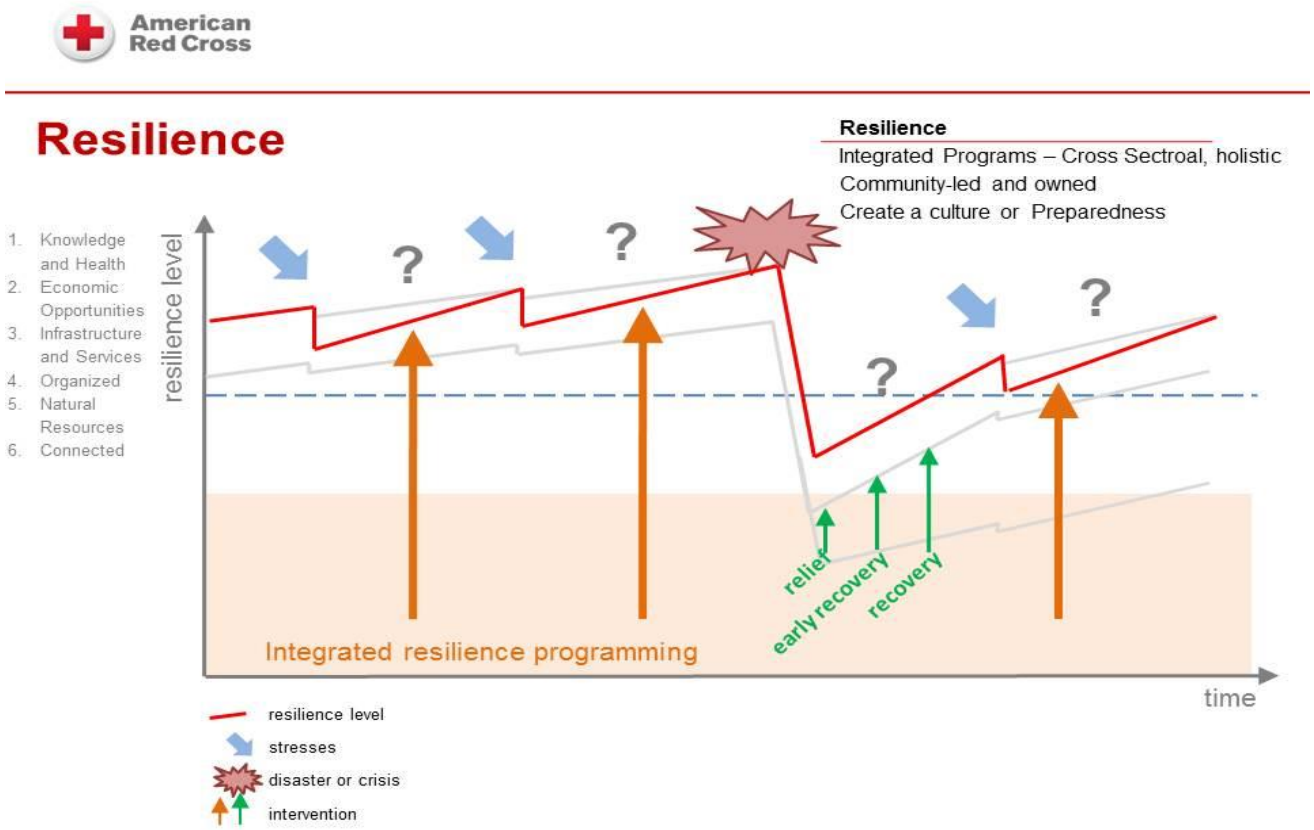
Much of the leadership on resilience continues to rest with the humanitarian funders, including the Office of US Foreign Disaster Assistance, which carries the lead for risk mitigation for large community-wide risks, and has made progress in recent years in mainstreaming funding for disaster risk reduction (DRR).

InterAction's working group on Disaster Risk Reduction (DRR) has been increasingly discussing how to get real attention to DRR, and recently has questioned whether to take on "resilience" as its key theme for accomplishing this.

Questions:

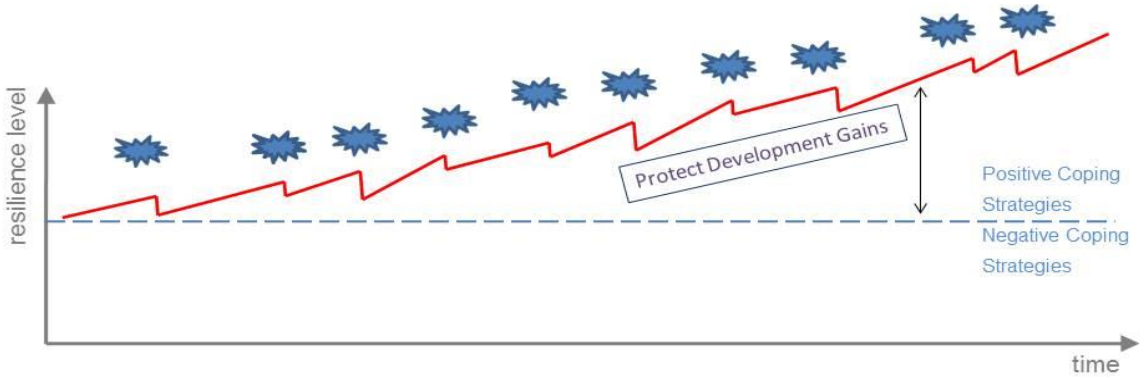
> Is the relief vs. development divide as wide as ever? Are there any solid examples of bridging it in the field?
>
> Is the divide reflected among donors as much as implementing agencies?
>
> If "resilience" were a post-2015 MDG-like global goal, would that help pull the risk/disaster people in to better conversation with governments and development planners?
>
> Is the humanitarian vs. development divide itself fragmented, the barriers being quite different between conflict, mass forced migration, short onset disasters, protracted droughts/famines, epidemics and other crises?

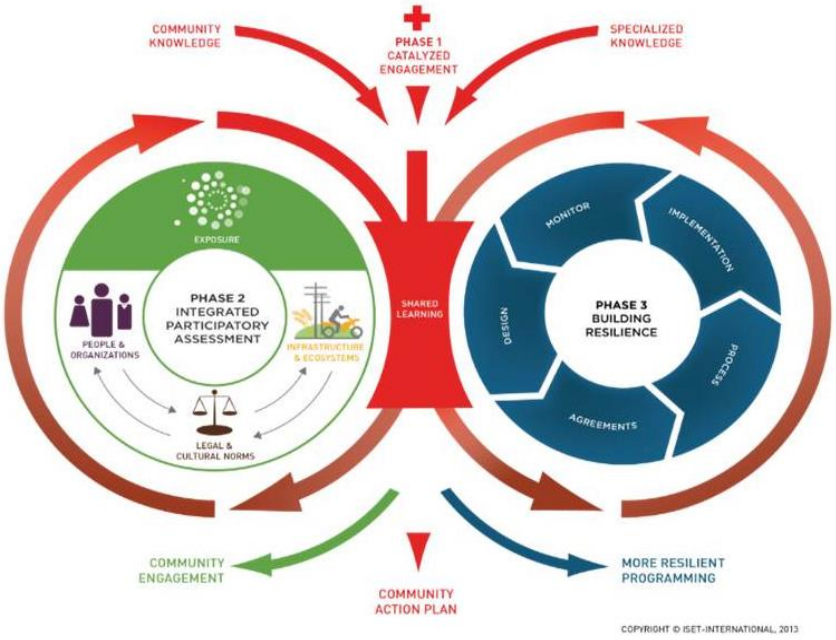
Rod Snider at the American Red Cross articulates how integrated resilience programming builds over time.



American Red Cross

# Community Resilience Through Integrated Programs



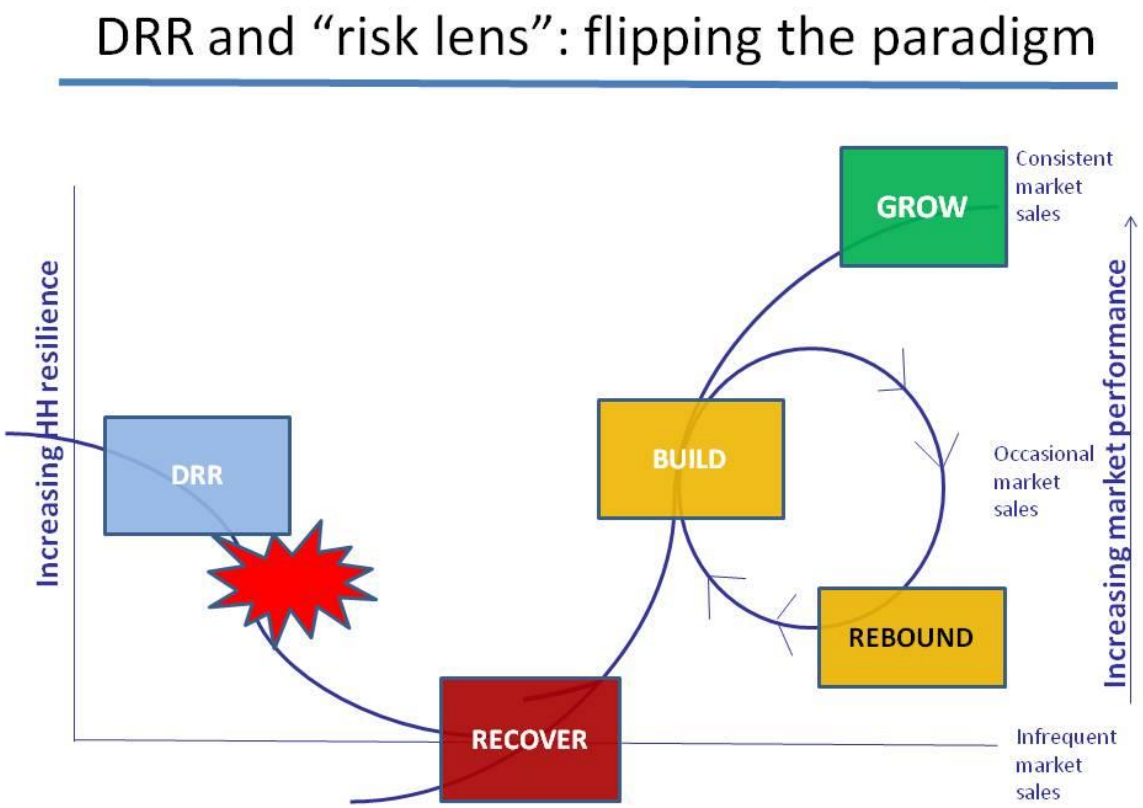





From CRS, Dina Brick observes about the Inherent trade-offs in humanitarian response and recovery:

- Timeframe of response and recovery :: resources available v. priorities

- We should not just "build back safer" – requires a **holistic** response




## Institutionalizing Resilience

This session is opening with comments on how major institutions have reconfigured their staffing, structures, processes and program cycles to embrace resilience in projects.

Within USAID, a key mechanism for promoting resilience has been the Joint Planning Cells for Resilience, or JPCs.

The International federation of Red Cross and Red Crescent Societies has been struggling with how to adapt resilient in its country programs.

Collaboration between WFP, Unicef and FAO around resilience was seen as a success in Somalia 2011/2012, and is now being replicated in other countries. What was the success of their collaboration? Does resilience have any play within UNHCR or the ICRC?

Questions to consider: How best can resilience concepts and theories-of-change be put into practice?

Should resilience principles be integrated into broader development programming as a cross-cutting theme?

How are DFID, EC/ECHO, the World Bank and UNDP institutionalizing resilience? The World Bank refers to it in its reports. UNDP is preparing its annual report this coming year on resilience.

In which forums can NGOs bring together their on food security, health, ecosystem/biodiversity and other experts to share insights about what works in achieving resilience?

Is there progress in integrating the DRR community with the Climate Change Adaptation community?

How is resilience cross-cutting with the new attention to risks in urban communities?

The World Bank suggests:

> *"Resilient cities* have the ability to respond to natural disasters and system shocks, and can provide reliable services under a wide set of unpredictable circumstances. These are cities that have built-in systems, such as diverse transport and land use, that can adapt to change."

# Operationalizing Resilience

This session begins with a review of the enormous gap in knowledge about how communities recognize the wide range of disabilities in their midst. One measure of social capital is how well communities address the different psychosocial and physical disabilities that are often under-estimated.

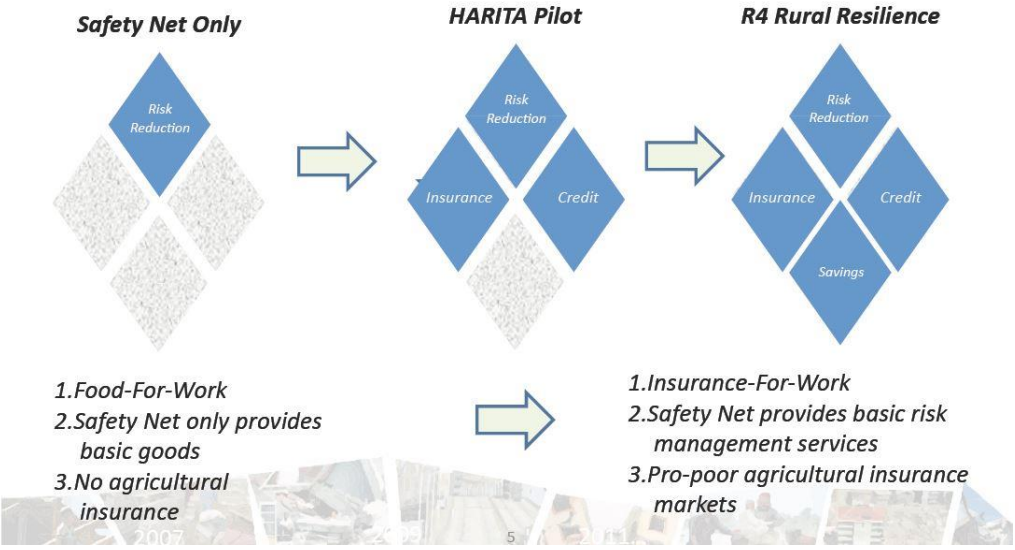
Dan Norrel from World Vision will point out the importance of Value Chains for integrating poor producers, the guide for which is on http://microlinks.kdidk.org/library/integrating-very-poor-value-chains-field-guide or skip the book and watch the movie! http://vimeo.com/6027874

Two provocative programs that propose future paradigms for resilience are the WFP/Afircan Union African Risk Capacity project, which helps to buffer risks or transfer shocks out of a population through re-insurance links. The R4 program which Oxfam, Rockefeller, WFP and Swiss Re piloted in Ethiopia attempts much of the same.

## Core Innovation: Insurance for Work

- "Game-changing" Innovation: drought insurance paid for with labor instead of cash—leading to commercially viable rates of uptake (versus other projects). Innovation suggested by farmers themselves.
- Partnering with "cash/food-for-work" safety net enables labor to be monetized. 8 million safety net participants in Ethiopia.
- Labor performed has an adaptation focus (example: terracing, education on cropping) = "doubling donor's dollar"
- Insurance linked to credit, savings, disaster risk reduction = holistic.
- Index weather insurance product is commercially viable, made available to cash paying farmers = building local agricultural insurance markets. Safety Net is pipeline, as farmers graduate.

## Evolution of Rural Resilience



# Evaluating Resilience

MEASUREMENT

**What are key facets of resilience that need to be built or strengthened?**
**Is there a pathway or continuum from fragile to resilience distinct from relief-to-development?**

**White Paper on Utilizing a Multi-Indicator Composite Index to Assess Resilience** – *Management Systems International (MSI)*

Resilience is a multi-dimensional construct however it is precisely defined. These dimensions include levels of application (individual, household, and so forth), it's temporal aspect (short, medium and long-term), the nature of the influence to which resilience is linked (a shock or chronic stress), and whether resilience is considered a state or in terms of "instrumental effects it exerts on targeted development outcomes."[2] In these respects, resilience shares many attributes with other constructs which are of interest to international development efforts. These include: sustainability; governance; stability; biodiversity; and "well-being." Another similarity across these constructs is the value of assessment over time (i.e., trends in quality), and in relative terms (e.g., is one environment more bio-diverse than another). Like these similar constructs, the measurement of resilience can prove challenging.

In attempting to measure multi-dimensional constructs social scientists, ecologists, political scientists and others have frequently turned to the use of indices composed of composite indicators. Examples across many fields abound in the literature, but the development of a widely-accepted composite index to measure resilience remains an important yet unfinished task.[3]
A logical place to begin (or continue past and current efforts) is with indices already developed and in use by USAID and other international development actors. For example, since 1997 USAID has utilized the Civil Society Organization (CSO) Sustainability Index in Eastern Europe and Eurasia, and later (2009) in Sub-Saharan Africa. Its methodology, developed by MSI for USAID, has been tested and improved over the years and is now widely used by other donors including the World Bank. In response to USAID's requirements, MSI has more recently developed and is using a composite index comprised of both quantitative and qualitative indicators to measure stability trends in Afghanistan.[4] Some of the latter involve measuring local (i.e., community) resilience to disruptions from outside the area, and local problem-solving which is a proxy for social capital and collective action – also important for resiliency.

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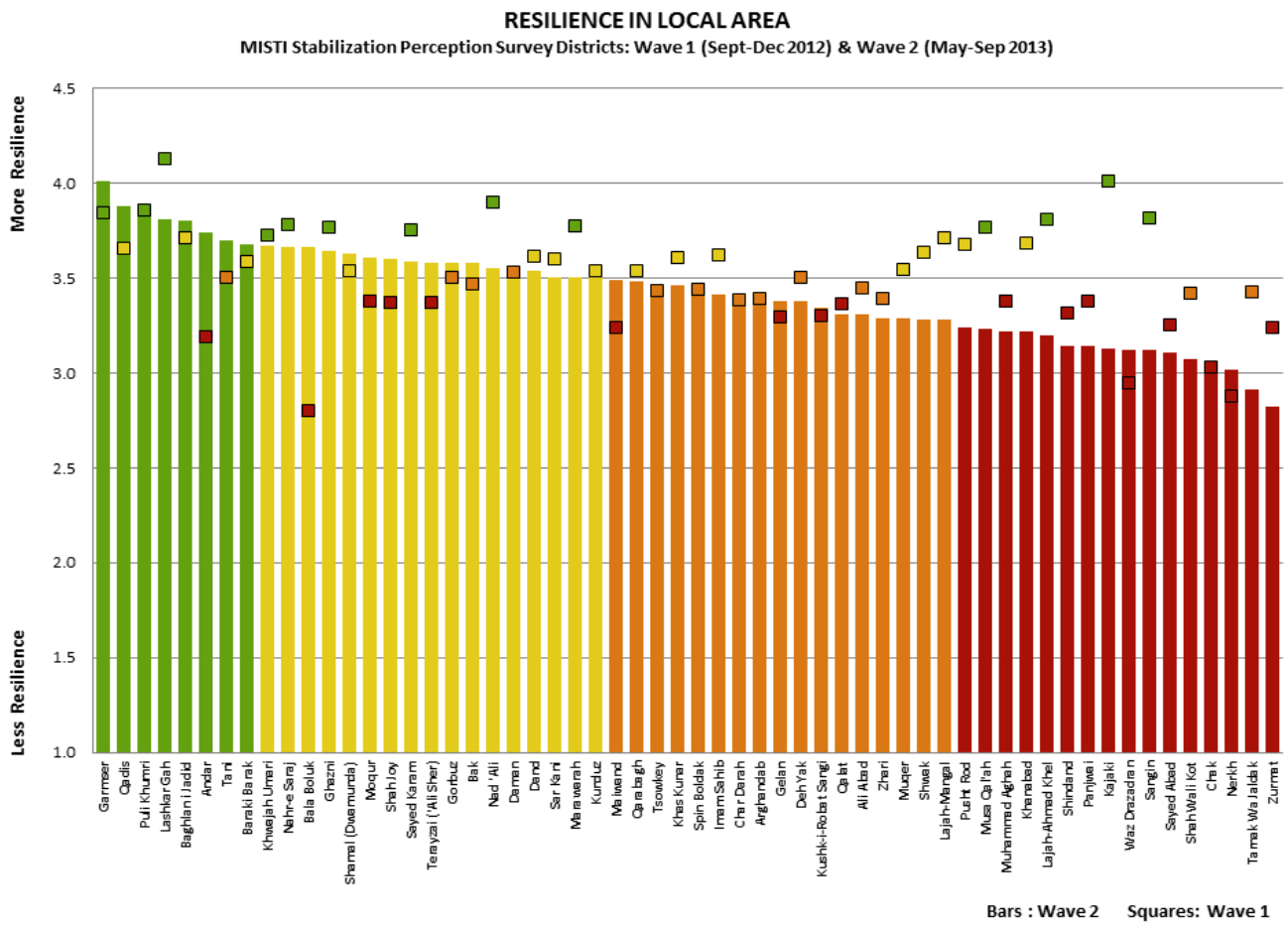
[2] As defined in Resilience Measurement Principles: Towards an Agenda for Measurement Design, resilience Measurement Technical Working Group, Food Security Information Network (FSIN), Technical series No. 1, January 2014.

[3] See Community Resilience: Conceptual Framework and Measurement, Feed the Future Learning Agenda, USAID October 2013.

[4] See MISTI Stability Trends and Impact Evaluation Survey: Design, Methods, Pilot and Indicators, USAID Development Experience Clearinghouse (DEC)
https://dec.usaid.gov/dec/GetDoc.axd...chmnt=VHJ12Q==&rID=MzM5ODIx




Based on this experience, MSI has begun work on the development of a resiliency index focused at the community-level and on medium-to-long-term "stressors" (e.g., climate change, conflict, crime and insecurity) rather than shocks. The design of the index will facilitate assessment over time to discern trends, as well as comparison across communities and regions.

Like with our stability work in Afghanistan (and Pakistan), MSI's approach to measuring resilience will rely on both index data on "what" is happening, and employ other quantitative and qualitative methods to address "why" questions. Initial piloting of the resiliency index is anticipated in South Sudan during late-2014.

## Measuring Community Resilience in the IFRC

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### 1. Summary

Given the increased attention to resilience-strengthening in the international humanitarian and development community, there has been concurrent interest in the measurement and the overall accountability of "resilience strengthening" initiatives. The literature is starting to reflect this trend, going beyond the polemic of defining resilience to its measurement. Drawing upon this literature and other sources,[1] **this paper provides a brief overview of key considerations in the measurement of community resilience (CR) for the IFRC.** A summary of key considerations that include:

a. ***The measurement of CR is new, and there are not many examples of or consensus for its measurement***.

b. ***We need to manage our expectations, and that of other stakeholders, for the measurement of CR.*** This includes acknowledging the methodological limitations of its measurement, and qualifying both the internal and external validity of any measurement and research. ***There is no simple recipe or blueprint for the measurement or CR.***

c. ***CR and its key components (characteristics) need to be clearly defined before they can be measured***. The latter will provide the conceptual architecture to identify, organize and ultimately measure the elements that add up to CR.

d. ***A critical distinction in measuring CR is that of measuring 1) a community's level of resilience, versus 2) the IFRC impact on the measured CR, versus 3) the IFRC contribution to CR***. Measuring overall CR is complex, and attributing IFRC impact to the measured CR is even more complex, acknowledging the multiple factors that affect CR. This does not mean that best attempts should not be made to measure CR and IFRC impact, but as elaborated below, such attempts should be strategic due to the investment required.

e. Given the scope and complexity of CR, ***the IFRC should be strategic in the capacity, resources, time, and partnerships we devote to its measurement***. Measuring CR itself is a considerable undertaking that may best be taken collaboratively as it is cuts across not only sectors and scales of intervention, but also actors involved. Studies should be strategically selected as part of a longitudinal approach over time and place. ***On the other hand, the measurement of the IFRC contribution to CR-strengthening (principles) can happen on a more regular basis per project/program***.

f. ***It will be important to identify CR principles that can be integrated into programming and metrics to track the IFRC contribution to CR***. Interest has already been expressed in a framework for CR that not only defines CR and how to measure it, but also how programs can incorporate and support CR (*principles*), and hence measure their contribution.

g. ***An approach to the measurement of CR will likely employ mixed-methods*** (quantitative and qualitative). Although there is an allure of quantitative methods to summarize in numbers a community's level of resilience, qualitative methods will be essential to involve and adapt to communities. Measurement will need to be flexible and adaptable to the very complexities that resilience is premised, allowing communities to identify and prioritize key indicators of resilience according to their local context. These can then be assessed and compared across time and place.

h. ***A participatory approach to measuring CR will reinforce the IFRC's organization culture and priorities***. An approach that involves and is adaptable to individual communities reinforces the IFRC operational culture and priorities to empower communities to address their vulnerabilities.

[1] This paper is informed by several sources: participation in the IFRC Working Group on Global Community Resilience; facilitation of the IFRC Roadmap for Resilience consultative process in Nairobi (10/2013); participation in 3 sessions on the measurement of resilience at the American Evaluation Association's annual conference (DC, 10-2013); participation in the "Flood Resilience Measurement Working Group" planning meeting conveyed by the Zurich Insurance Company Ltd (12/2013); related literature review of resilience, community resilience, and measuring resilience.
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## 2. Measuring community resilience (CR)

### Key distinctions in the measurement of CR

There are three important distinctions that I make for the measurement of community resilience, summarized in Table 1 below. The differences between measuring CR, versus our "impact" on CR, versus our "contribution" to CR entails different rigor and capacities that are best understood to frame expectations for feasible and credible measurement.

***There is an important difference between measuring CR and measuring our contribution to it***. I have framed this in the past as the difference in measuring the industry evaluation criteria "impact" (the changes we are making), versus measuring "effectiveness" (what we do to achieve change). The latter will be easier and within our capacity to more regularly measure. In other words, ***it is easier to measure objectives that contribute to CR, such as the integration or accomplishment of good practices supporting CR, than measuring CR itself***.

"The most appropriate indicators for resilience arguably focus on 'processes' rather than 'outcomes'. For example, a likely indicator for mainstreaming resilience into local and national poverty reduction strategies is the integration of any disaster risk reduction and resilience plans into these strategies and the frequency of cross-referencing between them.
***Therefore while it is possible to gauge whether the 'process' of mainstreaming is complete, it is difficult to capture whether this is leading to resilient 'outcomes'. It is also hard to quantify objectively, as successful outcomes are subjective and context-specific."***

***"(A) tool that captures all facets of resilience would be too cumbersome to be of any practical use." (UNDP 2013, Community Based Resilience Assessment - CoBRA)***

One notable example of a qualitative approach to CR measurement is the UNDP's Community Based Resilience Assessment (CoBRA), which is "very much based on understanding resilience from a community perspective." Communities themselves define what resilience means to them, but the UNDP's hypothesis is that, "that many households would define themselves as resilient when they are able to feed their families adequately every day, and meet basic needs." As such, a Household Economy Approach (HEA) is used to detail household level data for comparison over time to assess a households' ability to meet a set of defined minimum survival and livelihoods protection requirements.

### Mixed methods approaches to measurement

"There is rarely a single evaluation methodology that can fully capture all of the complexities of how programs operate in the real world." (Bamberger 2012, Introduction to Mixed Methods in Impact Evaluation.

As the above quote underscores, reality is complex, and it is unlikely concepts like "resilience" can be "wrapped up" and measured in one method. Just as it is best practice to triangulate one's sources in data collections, so is it increasingly recognized as best practice to combine different methods of data collection and analysis. For instance, such a mixed-methods approach is adopted by the aforementioned UNDP's Community Based Resilience Assessment (CoBRA):
"A mixed-method approach is needed that combines quantitative and qualitative measures. Given the mix of tangible and intangible assets involved and the dynamic nature of each component, measurement should entail a combination of traditional outcome measures with process measures, as well as others that capture capacity."

Whatever consensus is reached in the IFRC definition of CR and its key components, it is likely that the methodological approach used for its measurement will adopt mixed-methods.

**3. Defining community resilience (CR)**
It may be rhetorical, but we need to be specific about what we are to measure before we develop a methodology for its measurement. The IFRC is doing its best to arrive at consensus through a participatory process that recognizes and empowers the diversity of its stakeholders. As Table 2 summarizes, I recommend that a measurable definition of community resilience has three elements:

Identify CR principles that guide how programming can integrate, support and contribute to strengthening CR.

**Define community resilience (CR)**

**Currently, the IFRC framework for CR defines "resilience" as:**

"(T)the ability of individuals, communities, organizations or countries exposed to disasters and crises and underlying vulnerabilities to anticipate, prepare for, reduce the impact of, cope with and recover from the effects of shocks and stresses without compromising their long-term prospects". 3
The IFRC framework for community resilience needs to define resilience at the community level: i.e.
"Community resilience is the ability of a community to anticipate, prepare for, respond to, and recover from vulnerabilities without comprising its long-term prospect."
Is it prudent to define such a complex, multi-level concept at the community level? Resilience can be defined and measured in a variety of ways, i.e. depending on organizational focus, such as food security for FAO. "Community" is not only remarkably intuitive and attractive, with a currency in and beyond the RCRC, it is central to how IFRC operates. S2020 specifically identifies "community" in Strategic Aims 1 and 2, and Enabling Actions 1, 2, and is full of reference to "community" as the distinguishing characteristic of RCRC work:

"In short, we have demonstrated our comparative advantage to undertake direct voluntary action at community level in many different ways, while giving voice to the concerns and interests of vulnerable people in key decision-making forums."

"Our specific contribution to sustainable development is through strengthening community resilience."

"For us, communities are not targets but the starting point, and National Societies serve communities from the inside."

Public initiatives are regularly defined at the community/regional/national level, and the IFRC can do so at the community level. "Public health programs and policy are often defined at regional and national levels, but community is, literally, where prevention and intervention take place…. The results of our analysis point to a core definition of community as a group of people with diverse characteristics who are linked by social ties, share common perspectives, and engage in joint action in geographical locations or settings" (MacQueen et. al. 2001).

It is worth comparing this with another definition from an organization (USAID) that has also has a mandate of both humanitarian to development services: "(T)he ability of people, households, communities, countries, and systems to mitigate, adapt to, and recover from shocks and stresses in a manner that reduces chronic vulnerability and facilitates inclusive growth."
The resilience literature abounds with resilience framed and geographically bound at the community level (Kirmayer et al. 2009. Longstaff 2010, Pasteur 2011, Rand 2011, Teo et. al. 2013, UK Cabinet Office 2011). One reoccurring point in the literature is that defining resilience at the community level does not exclude the individual. "This community perspective does not negate the importance of individual agency. In fact, research on community resilience advances the view that people can directly and actively harness their surrounding resources to foster healing. A resilient community provides individuals and families with new opportunities and resources to deal with challenges (Sonn & Fisher, 1998)." (Kirmayer et al. 2009.)

**3.2 Components of community resilience (CR)**
Beyond a statement of definition, community resilience needs to be further demarcated into its key components, (or "characteristics" as framed in the ARUP studies on resilience commissioned the IFRC). This is an important consideration as it provides the conceptual architecture to identify, organize and ultimately measure the elements that add up to CR. I recommend adoption of the "Five Capitals" schematic for organizing the key components of CR, as summarized in Table 3. This recommendation comes after a review of the literature, as well as participation in participation in a "Flood Resilience Measurement Working Group" planning meeting conveyed by the Zurich Insurance Company Ltd (12/2013), consisting of professionals from both the private, academic, and civic sectors discussing the measurement of CR. The Five Capitals are relatively closely aligned with the six characteristics identified in the ARUP study for IFRC, but I feel they are a more intuitive and inclusive organizing structure for what adds up to CR. Related, I feel they have more industry recognition, popularized by DFID and adopted by other organizations such as UNDP.
It is worth noting the importance of social capital for the IFRC. One of the most influential interpretations of resilience is that of Daniel Aldrich, "Building Resilience: Social Capital in Post-Disaster Recovery. For example, this provides the conceptual underpinning for the USAID framework on resilience, making the distinction between **bonding, bridging, and linking social** capital. Social capital is especially important for the IFRC because what distinguishes us as a development-humanitarian organization is our inroads into communities through a network of branches, chapters, and the volunteers and staff working in them. This is reflected in IFRC studies such as, "Of networks, norms, and trust. The role of social capital in reinforcing community resilience" (2013).

## Selections from: the Summary of the Expert Consultation on Resilience Measurement for Food Security, published in February 2013
**FAO/WFP/EC/USAID**

Resilience measurement needs are not the same across humanitarian and development program managers, donors, and academics involved in socio-economic research. From a donor perspective, resilience measurement should include a significant focus on determining the most cost effective way of helping targeted beneficiaries, i.e., value for money. Despite this focus, there was an acknowledgement that initiatives that provided *value for money today* may not be equally cost effective tomorrow. Academic participants felt that more work was needed to ensure the reliability and validity of resilience measurements especially in the development of resilience indices. At the same time, the pursuit of increased precision and better analytics has made it difficult for development programmers to understand what is being measured and how it applies to determining better resilience practice.

**I. Introduction**

Over the last few decades, recurring crises in the Horn of Africa, the Sahel, and parts of Asia have cost international donors and national governments millions of dollars (Frankenberger et al. 2012). Despite meeting short-term humanitarian needs regarding survival, large-scale emergency interventions have not substantially improved regional or local capacity to withstand future shocks and stresses (USAID 2011). As a result, the concept of resilience has emerged as a plausible framework for substantially improving regional or local capacity to withstand future shocks and stresses, and reducing the need for humanitarian response. The main value of using a resilience concept lies in integrating approaches and communities of practice rather than as a novel approach to addressing poverty and food insecurity.

Given the relatively recent emergence of the concept of resilience within the wider development community, there is an understandable scarcity of robust, verifiable evidence of impact among programs seeking to build resilience (DfID 2011; Headey et al. 2012). A major milestone in achieving resilience at a significant scale will be the ability to measure resilience outcomes at the household, community and national levels. Empirical evidence is needed that illustrates what factors consistently contribute to resilience, to what types of shocks and in what contexts. Such evidence can be used both for planning and programing purposes as well as for assessing program impact.

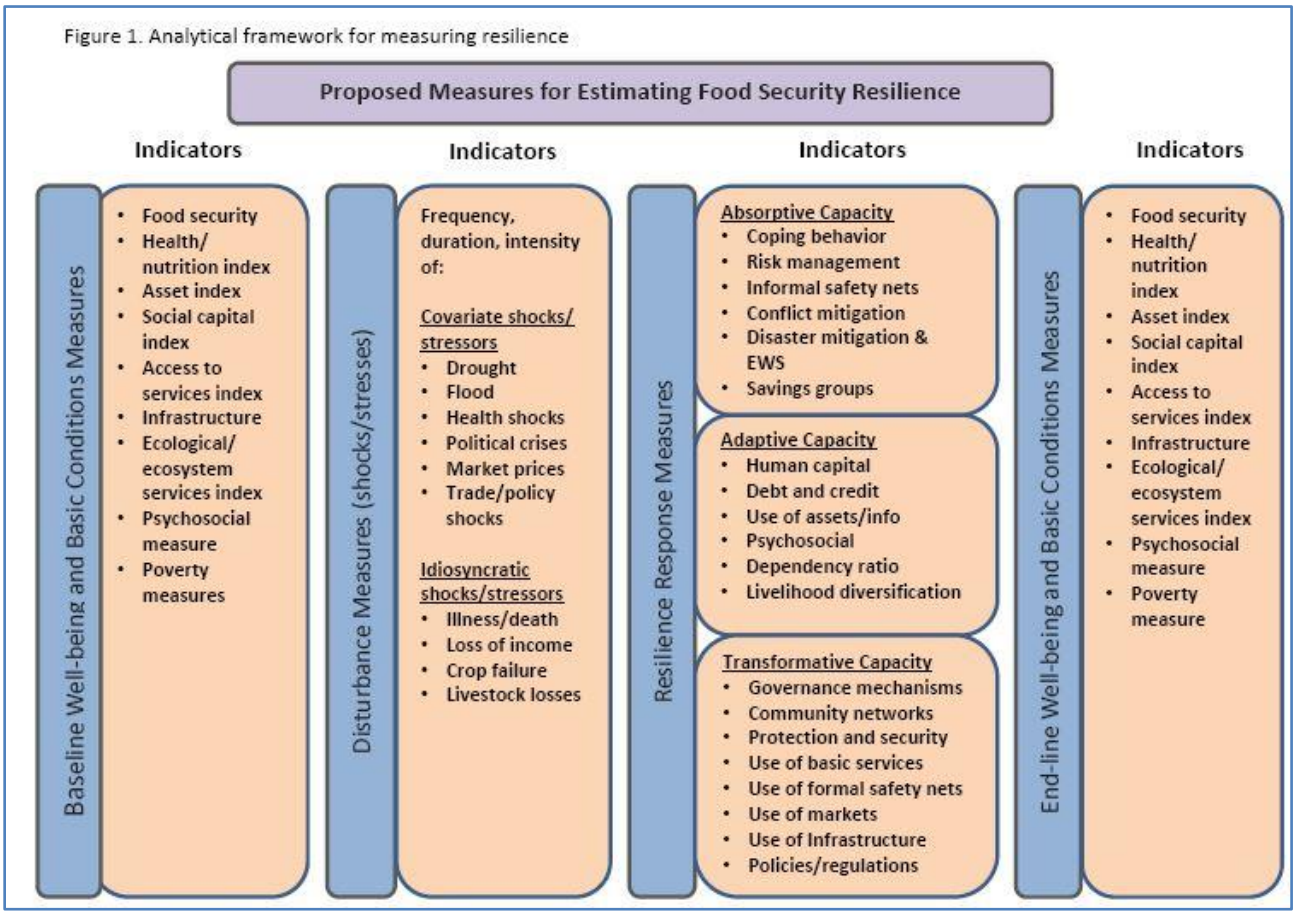
**….**

**II. Key Approaches to Measuring Resilience**

A number of models for measuring resilience were presented, each with their own strengths and limitations. Several studies take a multi-dimensional approach to measuring resilience, though they employ different types of analyses (e.g., FAO, University of Florence, Tulane, Oxfam GB, ACCRA, USAID). FAO's model involves development of a suite of latent variable indices that are derived from a number of observable indicators. These indices are then used to derive a single resilience index that is a weighted sum of the factors generated using Bartlett's scoring method and the weights are the proportions of variance explained by each factor.

The study conducted by the University of Florence expands on the approach developed by Alinovi et al. (2008, 2010) by applying it to a specific shock event. It measures food security resilience of rural households affected by Hurricane Mitch in Nicaragua in 1999 and produces a single agricultural resilience index, which is itself a composite index made up of 11 latent variables estimated through factor analysis (Ciani and Romano 2013). Though based on the FAO model, it adds certain household characteristics, and social, economic and physical connectivity, which suggests whether households are able to tap into alternative options for taking advantage of opportunities and accessing the resources needed in order to deal effectively with shocks, i.e., to adapt.

USAID's multi-dimensional approach to measuring resilience in the Horn of Africa and the Sahel seeks to identify resilience factors contributing to food security in the face of droughts. The model focuses on creating indices around six domains of resilience, each of which "contribute to and collectively constitute" resilience: income and food access, assets, social capital/safety nets, nutrition and health, adaptive capacity, and governance (Collins 2013).




The multi-dimensional approaches utilized by Oxfam and ACCRA involve identifying household and community characteristics of resilience, regardless of whether a shock has occurred. Oxfam utilizes the Alkire-Foster (AF) method of analysis rather than the multi-stage factor analysis described in the FAO study. Both factor analysis and Alkire-Foster analysis can help reduce the complexity inherent

in trying to measure a dynamic, multi-dimensional process such as resilience. One of the differences between the approaches utilized by Oxfam and FAO is in the assignment of weights. Oxfam's approach assigns weights for each dimension of resilience based on priorities identified by the researchers, though "there is no reason why the weights for either the dimensions or specific characteristics cannot be defined through stakeholder consultation and/or participatory processes" (Hughes 2013). In the FAO approach, weights are data-driven (i.e., derived by the data that are directly captured from the interviewed households ) and no assumption is subjectively done by the researchers. A resilience index may well predict food security but it does not add diagnostic value for programing. Deconstruction of indices into their separate factors can be very useful however, especially for understanding the complex nature of resilience and the relationships between the different factors or variables. Unpacking helps identify constraints and programatic priorities, and can verify or expose as false common assumptions or proxies.

Other approaches attempt to measure resilience by assessing household coping/adaptive strategies used in response to shocks (e.g., CRS, MC). CRS's Sahelian Resiliency Study analyzed not only exposure to specific types of shocks, but also the types of risk management strategies households adopt in order to deal with them, including coping responses (short-term adjustments until the household returns to its prior livelihood strategy) and adaptive responses (structural changes in livelihood strategies in response to shocks or longer-term stressors). Thus, the study examines differences in risk management strategies adopted by households and how those differences lead to differences in both current food security status and household resilience (TANGO 2012b). The Mercy Corps study examines household resilience factors most closely associated with the conflict, drought and governance shocks that resulted in the 2011 famine in Somalia. Again, this study assesses both coping and adaptive strategies adopted by households in response to shocks, as well as other well-being outcomes.

Still other approaches focus on outcome monitoring, i.e., tracking whether well-being indicators are stable (or change) in response to shock (e.g., HEA, WFP). WFP is using trend analysis of historical food security indicators to measure household resilience in Niger (Bauer et al. 2013). Analysis focuses primarily on the speed and extent of recovery following the drought in 2009.The Household Economy Analysis is being used in a number of instances (e.g., Food Economy Group, The Wahenga Institute) to assess the effect of shocks and stressors on future access to household food and income. In assessing outcomes through HEA, total household income (food and non-food income) is converted into a common unit (% kcals or cash) and compared against two thresholds, each of which is defined on the basis of local patterns of expenditure.

Certain approaches have or will make use of panel data, considered the ideal source of data for measuring resilience (e.g., CRS, MC, University of Florence, USAID, FAO/WFP/UNICEF). Some approaches stress the importance of using existing data wherever possible (e.g., USAID, FAO, WFP, HEA, IFAD), such as the Living Standards Measurement Study (LSMS), Household Income and Expenditure Surveys (HIES), population based surveys (PBS), national household surveys, etc.

**III. Key Summary Points for Resilience Measurement**

Over the course of the three day workshop, certain themes and issues emerged as overarching considerations for measuring resilience. In no order of importance, they are listed below.

• **Focus of measurement:** From a donor perspective, resilience measurement should include significant focus on determining the most cost effective way of helping targeted beneficiaries, i.e., value for money. Cost effectiveness was not considered to be necessarily more important than, or contradictory to, improving the well-being of targeted beneficiaries. Value for money suggests a view that stresses the number of people that are reached per dollar; a resilience perspective focuses on identifying who needs that dollar and how they can most effectively be helped to deal with future shocks. However, more analytical work is needed on the relative costs and benefits of different interventions within different contexts, particularly quantifying benefits over the longer-term.

There is however, tension between what worked "yesterday" (i.e., what was measured) and what will work in the future. Yesterday's solutions may not necessarily represent solutions to tomorrow's problems. Likewise, what provided value for money today may not be equally cost effective tomorrow. Thus, emphasis on value for money over program impact may not prove satisfactory from a donor perspective in the long run, particularly when considering the cost of not taking action.

In geographic areas where multiple donors are funding complementary or overlapping programs, measurement approaches will need to consider contribution rather than attribution.

**Qualitative approaches:** Qualitative data needs to be collected more regularly to help contextualize measurement dimensions and to enable better understanding of the perceived significance of changes that are measured quantitatively. Qualitative surveys enhance understanding of local concepts and definitions of resilience, intangible measures of resilience (e.g., social capital), the interrelationships between capitals (e.g., how improvements in social capital, such as through training or education, can lead to increased income, or financial capital), and the factors contributing to adaptive and transformative capacities within different contexts.

• **Technical standards:** More work is needed to ensure the reliability and validity of resilience measurements, especially in the development of resilience indices. The multidimensionality and dynamic nature of resilience makes it difficult to measure. Factor analysis and the Alkire-Foster method help reduce the complexity of measuring resilience. However, great care needs to be taken when identifying factors to be included in such analysis and in assigning weights.

Resilience is a determinant of an outcome (e.g., food security, poverty, nutritional status, health status). The degree to which a particular household, community or population may be considered resilient is determined in part by their ability to maintain or improve their well-being (i.e., escape poverty traps) in the event of periodic shocks. However, in the construction of resilience indices, the same variable should not be used both as a resilience outcome and a predictor of resilience.

• **General/flexible framework:** Participants agreed on the need for an analytical framework that is general enough to be applied in different contexts but flexible enough to be contextualized. According to Constas and Barrett (2013), two sets of metrics are required to effectively measure resilience to food insecurity: standard measures and context-specific measures. Combining input from Constas and Barrett (2103) with that from participant discussions at the consultation, a framework in which standard measures can be used to model dynamics of resilience in relation to

food security and are general enough to allow their use across various contexts was developed and is presented in Figure 1. Standard measures include baseline well-being and basic conditions, or "initial states," disturbance measures (e.g., shocks, stressors), resilience response measures (e.g., absorptive capacity, adaptive capacity, transformative capacity), and well-being and basic conditions measures at the end-line.

***Measures of the initial dynamic state*** include food security, health/nutrition, assets, social capital, access to services, infrastructure, ecological/ecosystem services, psychosocial measures and additional poverty measures.

***Disturbance measures*** include measuring the type, duration, intensity and frequency of shock or disturbance. Shocks are natural, social, economic, and political in nature. They can occur as slow or rapid onset shocks or longer-term stresses or trends and can be idiosyncratic or covariate in nature. Shocks can be transitory, seasonal, or structural, and their frequency, severity and duration can vary widely.

Building resilience requires an integrated approach, and a long-term commitment to improving three critical capacities: ***absorptive capacity*** (e.g., coping strategies, risk management, savings groups), ***adaptive capacity*** (e.g., use of assets, attitudes/motivation, livelihood diversification, human capital) and ***transformative capacity*** (e.g., governance mechanisms, policies/regulations, community networks, formal safety nets). Resilience responses can be measured before, during and after shock and at household, community and higher systems levels.

Resilience is a determinant of well-being outcomes, such as food security, poverty, nutritional status, health status. ***Ex post analysis of the well-being and basic conditions indicators*** measured at baseline allows for analysis of changes over time as the basic measure of resilience.

***Resilience is context-specific***, i.e., it is defined by the type of change or shock experienced, as well as by the social, economic, environmental, and political context in which the shock occurred and household or community response decisions are made. Context-specific measures will vary by program, location, population, etc., but could be based on a shared framework of contextual categories (see Figure 1), which would allow for comparison across contexts.

• **Resilience learning:** Given the context-specificity of resilience, there was a widely recognized need for identifying what constitutes resilience within various contexts. Currently Tulane University is working with 20 universities across Africa to establish resilience hubs that will help contextualize resilience and enhance understanding of the drivers of household and community resilience within different environments. In addition, a focal point or repository (e.g., regional center of excellence) for housing and disseminating resilience best practices is urgently needed.

• **Community and higher systems levels:** There is currently less work being done to measure resilience at the community or higher systems levels, where indicators can help capture non-linear trends and tipping points or thresholds. Measures of community resilience may be better captured through qualitative techniques and include proxies for social cohesion, socio-political organization, community-based planning, reciprocity (including informal risk mitigation mechanisms), community-based ecosystem management, intercommunity relationships/cooperation and ability to restructure community capacities. Other measures that contribute to community resilience include market access, conflict resolution mechanisms, and access to basic services. Higher level governance and enabling conditions at the regional or national levels that contribute to household

and community resilience include legal/regulatory frameworks, large-scale infrastructure, information systems, contingency preparedness plans, and formal safety nets.

**IV. Moving Resilience Measurement Forward**

While verifiable evidence on the impact of resilience programing continues to build, there remains a need for continued research regarding how best to assess or measure household reaction to the shocks and stresses they experience, as well as the extent to which program interventions enhance resilience to those shocks. The recently established Food Security Information Network (FSIN) has emerged as an umbrella mechanism under which to facilitate activities outlined by the group as important next steps.

**Establish a Community of Practice (CoP):** As an important first step, a Community of Practice on food and nutrition security resilience measurement will be established as a forum to vet ideas among practitioners. Among others, the CoP will draw on participants from the Expert Consultation, as well as members of regional bodies (e.g., IGAD, SADC), national institutions, NGOs, donors, the Global Alliance for Action for Drought Resilience and Growth and the Global Alliance for Resilience Initiative-Sahel/West Africa (AGIR). By identifying and sharing best practices in resilience measurement, the CoP will help link the demand and supply sides of measuring resilience (i.e., linking programs to analysis). Information shared through the CoP can serve as the technical evidence base for country investment planning. The CoP will also facilitate evidence-based food and nutrition security decision-making at national, regional and global levels.

**Establish Technical Working Group (TWG):** A small, task-oriented Technical Working Group (TWG) on resilience measurement will be established to help draft the analytical framework, identify guidelines, principles and good practices for measuring resilience, review case studies and pilots, or conduct further tests of existing approaches in various contexts. The TWG will also review papers by practitioners and other stakeholders prior to publication.

**Definition of Resilience: Resilience Capacity and the Value of Subjective States**

The provision of a clearly stated definition of the object to be measured is a critical point of departure for measurement. While resilience has received a good deal of attention, it would be fairto say that the field has not reached consensus on a definition. The position taken by the RM-TWG is that it is important to provide a definition that is clear, concise, and ultimately, easily operationalized. Following a period of deliberation by the RM-TWG, the following succinct definition of resilience was agreed upon:

***Resilience is the capacity that ensures adverse stressors and shocks do not have long-lasting adverse development consequences***

One of the key features of this definition is that resilience is understood and measured according to the instrumental effects it exerts on targeted development outcomes that may be affected by stressors and shocks. Defining resilience as a capacity means that resilience is comprised of a set of ex ante attributes and supports that should positively shift the likelihood function that describes the relationship between shocks and development outcomes, such as food security. A fundamental question to answer from the outset concerns the distinctiveness of resilience.

Does resilience offer a new perspective or does resilience simply offer a different vocabulary to describe vulnerability? While closely related to the concept of vulnerability, it is important to note that resilience is not merely the inverse of vulnerability. Vulnerability describes a set of conditions that prevents people from managing adverse events, resilience is comprised of a set of responses that may counter the structural and stochastic factors that allow a household or other unit to be vulnerable when exposed to some set of shocks and stressors. In this sense, vulnerability refers to the set of characteristics that increases the probability of descent when exposed to risks. Expanding on the initial definition provided above, resilience capacity includes the array of characteristics, actions, and strategies taken to prevent and/or counter the effect of such risks. Whereas vulnerability has the effect of enabling the causal connections between shocks and negative outcomes, resilience has the effect of disabling or transforming those causal connections. A more extended discussion of the relationship between vulnerability and resilience is offered in Section IV of the paper.

The value added proposition of the resilience concept is that it draws attention to the inferential and programmatic benefits associated with including resilience as an additional explanatory variable, one that may improve our ability to more accurately estimate the effects that shocks and stressors have on a particular outcome. A simplified formulation highlights the relationship among resilience, vulnerability, and shocks in connection with, for example, food security:

> **Food security = f (vulnerability, resilience capacity, shocks)**

To promote resilience as a pro-poor concept, it is also important **to define resilience as a capacity that prevents individuals, households, and communities from falling below a normatively defined level for a given developmental outcome (e.g., food security, poverty level, wellbeing).**

Thus, the configuration of capacities that constitutes resilience will differ depending on the outcome against which those capacities are indexed. Resilience capacity for food security, for example, may differ from capacities identified for health-related outcomes, social outcomes, economic outcomes, or political outcomes.

**Measurement Principle 1: Resilience as a Normatively Indexed Capacity**

> *Resilience is a capacity that should be indexed to a given development outcome (e.g., food security, poverty, health) with a normative threshold. Measures of resilience should therefore be developed in relation to the instrumental value that such capacity has for a particular outcome. The outcome of interest should include a normative boundary that defines a threshold condition below which the well-being of an individual, household, or community is unacceptable.*

Work on poverty assessments (see Pradhan and Ravallion, 2000; Ravallion, 2012; Ravallion and Lokshin, 2000) has highlighted the need to include subjective measures. Subjective measures are important because they provide empirical access to perception-based indicators. The tacit assumption that resilience is a response to a shock or stressor highlights the need to collect data related to the mere recognition that the objective conditions that might be categorized as shock are aligned with the subjective perceptions that those conditions are recognized as a disturbance that

threatens some element of human welfare. The assumption also calls attention to the need to collect measurement data on perceptions about the expected outcomes, both for the consequences of a shock itself and for actions that may be taken in connection with a shock. The highly individualized, deeply situated (in personal histories and local contexts) of such perceptions calls for the use of qualitative indicators alongside quantitative indicators.

**Measurement Principle 2: Subjective States and Qualitative Data**
*The role played by subjective states in resilience, such as perceptions of shocks, perceived utility of actions taken or not taken, and general expectations of future states, should be included as key components of resilience measurement. The potential value of qualitative indicators should be included as an element of such subjective assessments.*

## III. Key Features of the Resilience Construct and Implications for Measurement

There is an extensive literature on resilience pursued in a variety of fields including ecology (Gunderson et al., 2010; Holling, 1973), engineering (Hollnagel et al., 2006), psychology (Garmezy, 1991; Cicchetti, 2010), and geography (Adger, 2000; Pike et al., 2010). A number of themes, which should inform the development of resilience measures, can be drawn from across these literatures. The key themes identified here highlight the importance of developing measures of resilience that are sensitive to:

- Systems and complex causality
- Shock and stressor specificity
- Desirable and undesirable equilibria
- Inherent volatility and instability
- Multiple-scales and multi-level interactions
- Rates of change and timing of measurement

At a general level, these themes illustrate some of the ways in which resilience requires a different approach to explain the dynamic relationship between shocks and stressors and well-being outcomes.

**Systems and complex causality** – Factors that enhance resilience are often organized according to a systems-oriented framework (see Bahadur et al., 2010; Folke et al., 2010; Holling, 1973). A systems oriented approach has been applied to both poverty and food security

(2010, p. 10) described food systems as complex adaptive systems (following Perrings, 1998) that exhibit path dependency, discontinuous change, multiple equilibria, and non-linearity. The complex cause and effect relationships produced by such interactions should be modeled, both to serve the purpose of articulating change models to inform programs and to serve the purpose of articulating estimation models to inform analysis of measurement data.

**Measurement Principle 3: Systems and Complex Causality**
*A vital first step in the development of resilience measures requires the modeling of an outcome of interest as the result of a series of interactions among the conditions, attributes and processes, and disturbances that affect well-being. Both qualitative and quantitative data will serve a valuable function in the effort to understand resilience capacity and map its origins and influences.*

**Disturbance specificity** – Within ecological systems, resilience is measured as a response to shocks or a collection of stressors. The disturbance could be a catastrophic event shared by a large group of people (covariate shock) or a shock experienced only within a given household or community (idiosyncratic shock). The disturbance might also be the result of stresses that are less dramatic and garner less attention, but have a combined cumulative effect that nonetheless threatens food and nutrition security. Households and communities may experience multiple shocks and stressors simultaneously. The full range of shocks and stressors need to be understood over time. If resilience is a response, either in the form of anticipatory actions taken in advance of a shock, or in the form of actions taken during and after the shock, detailed data on the shocks itself are central to resilience measurement. Responses to different types of shocks and stressors could be contradictory and the strategies for managing these different shocks could be at odds. One therefore needs to start with a comprehensive analysis of the potential hazards, their trends and their links to local contexts.

**Desirable and Undesirable Equilibria** – Although the bounce-back feature of resilience is a common point of departure for discussions of how resilience might be applied to development, the tendency to emphasize the return to a prior equilibrium state should be questioned. When the prior state is characterized as one of high poverty and perilously low food security the idea of "bouncing back" is clearly sub-optimal. Structuring our empirical expectations and measurement objectives as a "return to prior state problem" is not consistent with more nuanced views of resilience and is at odds with humanitarian principles that undergird both emergency response and development assistance strategies. It may, however, be the case that returning to a prior state is desirable for some elements of a system of interconnected conditions that affect food security.
For example, the reconstitution of productive social groups and the recovery of basic infrastructure (e.g., roads, communication systems) that may have been disrupted by a shock are two conditions where the return to stability would be favorable. Conversely, the post-shock reinstatement of systems of governance and institutions that undermine food security would not be desirable. Judgments about when a return to prior state is advantageous and when it is not, represents one of the challenges of designing measurements of resilience for food security.

**Measurement Principle 5: Desirable and Undesirable Equilibria**
*Resilience measures should contain indicators that help one identify those instances when the return to a prior state is and when it is not desirable.*

**Measurement Principle 4: Shock and Stressor Specificity**
*Resilience measures should be sensitive to the specific types of shocks and/or stressors that are seen as threatening a given development outcome. The necessity of highly detailed, technically sound shock modules is therefore central to resilience measurement.*

**Instability and Chaotic Behavior** – In addition to raising questions about the stability of conditions on which food security depends, the assumption that a prior state could be characterized as stable may or may not reflect the reality of target populations. Situations where food insecurity exists may sometimes be characterized by high volatility. The idea that food security itself is dynamic rather than static is well established (see Christiaenson et al., 1999; Devereux, 2006). The assumption that the conditions prior to and following a disturbance can be understood

in terms of stability or equilibrium may often be misguided. One of the measurement challenges associated with the stability-volatility question involves decisions about how measurement tools can be sensitive to the existence and effects of inherently unstable components of food security.

**Multi-Scale and Multi-Level Interactions** – Although a definition of resilience has been offered above, it is useful to consider other definitions of resilience that highlight important features of the resilience concept. Frankenberger et al. (2013a, p.1), for example, defined resilience as "[t]he ability of countries, communities, and households to anticipate, adapt to, and/or recover from the effects of potentially hazardous occurrences (natural disasters, economic instability, conflict) in a manner that protects livelihoods, accelerates and sustains recovery, and supports economic and social development". An important feature of this definition is that it describes resilience as a multi-scalar (from countries to households) concept and that it focuses on economic and social components that underwrite food security. Resilience is likely to be influenced by the interactions of different processes at different levels and scales. For example governance structures at various levels can have a significant impact on household resilience. For this reason it is important to identify the key drivers of resilience at higher and lower levels and across scales. Modeling strategies used to capture these interactions (e.g., hierarchical models, agent based models, and structural equation models) will be an important feature of resilience measurement.

**Measurement Principle 6: Inherent Volatility and Instability**
*Resilience measures should be sensitive to the fact that conditions before and after a shock may be best characterized by systemic volatility or by patterns that can only be described as chaotic. Resilience measures, and associated analytical methods, should be structured to detect, measure, and model such volatility and chaotic behavior.*

**Measurement Principle 7: Multiple Scales and Multi-Level Interactions**
*Resilience is a capacity that can be observed at different levels, ranging from individuals, to households, communities, and nations. One of the challenges of developing measures of resilience involves identification of the mechanisms that explain how resilience capacity functions within and between levels to exert positive effects on well-being outcomes.*

**Rates of Change and Temporal Sensitivity** – Viewing resilience as the interaction of dynamic factors that change over time means that the timing of measurements should be carefully specified. This argues for non-arbitrary specification of data collection events. Ideally, the timing of measures should be determined according to knowledge of expected rates of change for both the outcome of interest and the factors that influence those outcomes. The idea of differently speeded variables posited by resilience theory (Gunderson and Holling, 2002) suggests that outcomes at different scales (e.g., household, community, institutional) are likely to change at varying rates. One would not expect, for example, that institutions and systems of governance on which food security may depend would change at the same rate as food security related behavior of individuals or households.

**Measurement Principle 8: Rates of Change and Timing of Measurement**

> *The time points at which data on resilience capacity, and shocks and stressors are collected should be informed by knowledge of expected rates of change/growth associated with a particular unit or scale of measurement for resilience capacity.*

## Selections from "Understanding uncertainty and reducing vulnerability: lessons from resilience thinking" by *Fikret Berkes* *Nat Hazards (2007) 41:283–295*

Vulnerability is registered not by exposure to hazards alone; it also resides in the resilience of the system experiencing the hazard. Resilience (the capacity of a system to absorb recurrent disturbances, such as natural disasters, so as to retain essential structures, processes and feedbacks) is important for the discussion of vulnerability for three reasons: (1) it helps evaluate hazards holistically in coupled human–environment systems, (2) it puts the emphasis on the ability of as system to deal with a hazard, absorbing the disturbance or adapting to it, and (3) it is forward-looking and helps explore policy options for dealing with uncertainty and future change. Building resilience into human–environment systems is an effective
way to cope with change characterized by surprises and unknowable risks. There seem to be four



**Table 1** Strategies that have a high probability of enhancing resilience to future change

| Strategies | Description |
|---|---|
| Foster ecological, economic and cultural diversity | Diversity provides the seeds for new opportunities and maximizes the options for coping with change. By supporting and protecting ecological, economic and social diversity, countries or regions make themselves less vulnerable to adverse effects of future change. |
| Plan for changes that are likely to occur | By recognizing the directional nature of current changes, and by identifying external drivers of change, countries have the opportunity to design the institutional flexibility necessary to anticipate and adjust to change. |
| Foster learning | Countries, communities, NGOs, and government agencies can learn from one another. By collaborating closely to examine patterns of response to hazards, it is possible to learn which policy options show promise. Particularly effective are learning networks of public, private and civil society actors. |
| Communicate the societal consequences of recent changes | Societal consequences of hazards are felt at multiple levels. The communication of the consequences of perturbations is important in understanding actual local impacts and adaptations. Such communication helps make a convincing case that the global nature of causes warrants global action. |

clusters of factors relevant to building resilience: (1) learning to live with change and uncertainty, (2) nurturing various types of ecological, social and political diversity for increasing options and reducing risks, (3) increasing the range of knowledge for learning and problem-solving, and (4) creating opportunities
for self-organization, including strengthening of local institutions and building cross-scale linkages and problem-solving networks.

We need to know when and under what circumstances a hazard or perturbation might lead to a non-linear response, a response that is out of proportion to the size of the perturbation, that might have serious and unanticipated consequences (Kinziget al. 2000).

Some insights could be gained through long-term studies of gradual change. But more importantly, we need insights from non-linear changes, that is, when the rate of transformation is suddenly altered, or change occurs in a discontinuous way. Thus, we need an analysis of integrated social environmental systems to improve our ability to forecast and respond to change (Berkes et al. 2003).

We also need to know when and under what circumstances a hazard might trigger a threshold effect (a breakpoint that occurs in systems with multiple stable states). Discontinuous change is often linked to crossing a threshold, although not all nonlinear change is discontinuous. The shift from one stable state to another is a regime shift or a flip. Such a regime shift occurs when the threshold level of a controlling variable is exceeded, such that the nature of feedbacks changes, resulting in a change of direction (trajectory) of the system itself (Walker and Meyers 2004).

Threshold effects may not be widely discussed in an explicit way in the hazards literature, but they are implicit for example in models of mudslides and avalanches. The possibility of runaway feedbacks (for example, due to permafrost thawing and methane release) is one kind of threshold effect that has been discussed for some time in the area of climate change (Holling 1986). Threshold effects are in fact pervasive in both biophysical systems (e.g., the breaching of a dam due to earthquake) and social systems (e.g., a society dissolving into chaos after a war or natural disaster). The recognition of the pervasiveness of non-linear responses and threshold effects are part of the revolution in the current science of ecology.

■