Science for Human Rights

Methods for

Security and Humanitarian Aid

(a work in progress)

Based on work by Scott Edwards, SHR Director, AIUSA

Topics

Overview

Research and Information Gathering

Computational Tools

Data Visualization

Education and Training

Economic, Social, and Cultural rights (ESCR)

Science for Human Rights Is Not New

- Analysis and studies of environmental hazards
  - Lead
  - Air pollution
  - Pesticides used by farm labor
- Vaccines to disadvantaged regions
- Medical Forensics
  - Argentina, Chile, ...

Human Right to the Benefits of Science

- The human right to the benefits of science was first internationally recognized in the 1948 United Nations Universal Declaration of Human Rights (UDHR)
- More recent tenets of the right include:
  - Equitable access to the benefits of scientific progress, with particular focus on vulnerable and marginalized groups
  - Investing in R&D and creating incentives for innovation to address suffering of these groups
  - Freedom of scientists to engage in scientific inquiry, while also conducting their work responsibly
  - Fostering international cooperation in science

Summary of AAAS Statement on Right to Science

- Adopted 4/16/2010
- AAAS will:
  - Highlight the importance of discussions concerning the human right to benefit from science
  - Engage the domestic and global scientific communities in defining the right, and determining its application to a diverse range of scientific disciplines and concerns
  - Coordinate the efforts of the AAAS science and human rights coalition to pursue strategies for integrating this right into the work of coalition members
  - Building on these activities, engage the US government and other key actors in dialogue on the right to benefit from science, and its implications for policies and programs

Science-Based Humanitarian Methods

- Research and Information Gathering
  - Satellite Imaging
  - Crowd Sourcing – using modern telecommunications
    - Participatory geographic information systems (GIS)
    - Must be careful to protect sources
- Computational Tools
  - Artificial Intelligence
    - Searching news reports
    - Language recognition
  - Automated Image Analysis
  - Models of Forced Migration
- Data Visualization
  - Geospatial mapping
- Training
- Economic, Social, and Cultural rights (ESCR)
  - Medical technology

Technology: Power to the People

- Cell phones are everywhere
  - Even in poor, developing regions
  - Especially useful with cameras
    - Exposing possible government murder in china with photos from phones
    - Government cover up tried to censor photographs, but couldn't stop the Internet distribution
  - And video
    - SF BART shooting was video recorded on a cell phone
  - For many poor people, cell phones are their livelihoods
    - Allow efficient travel for business deals (fuel costs oppressive)
  - Citizen reporting
    - Buying a sim card normally requires a name and ID, but many stores don't check them. This allows anonymous phone use.
- Solar cells to power the above (e.g. Africa)
- Cell is the only Internet access available at many homes

21st Century Human Rights Monitoring, Advocacy, and Conflict Avoidance

- Since 2008, AIUSA has been working with the wider AI movement to modernize the tools and techniques of the human rights advocacy trade.
  - Satellite imaging
  - Computational analysis tools
    - Artificial intelligence
    - Image feature extraction (huts, fires, buildings, ...)
    - Migration models
  - Data Visualization
    - Geospatial mapping
    - User selected data filtering/combining
  - “Crowd sourcing”

Research and Information Gathering

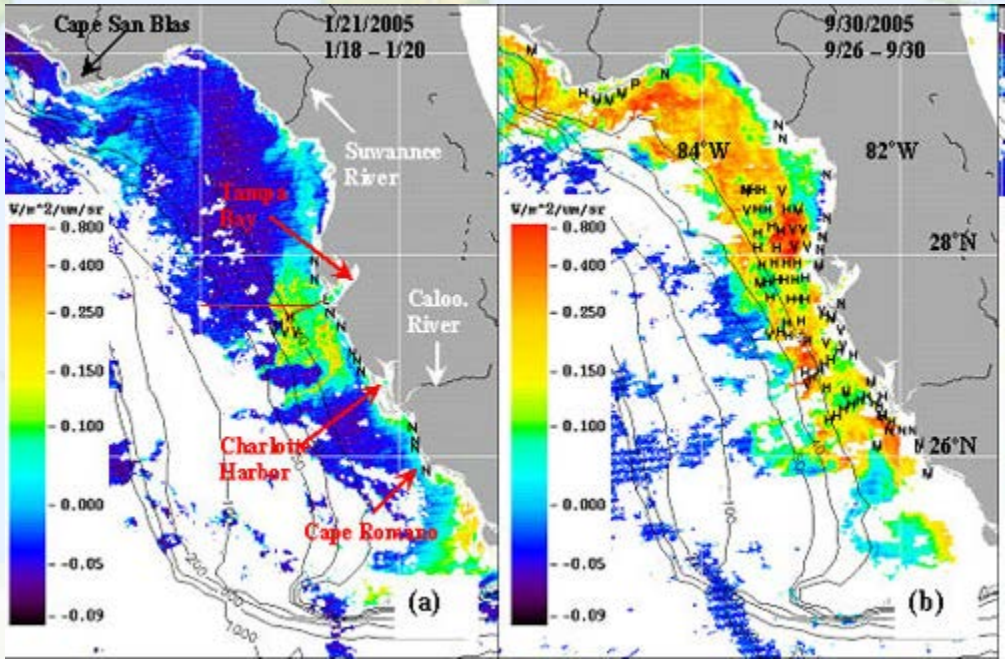
Satellite Imaging

Crowd Sourcing

Alternative Data Streams

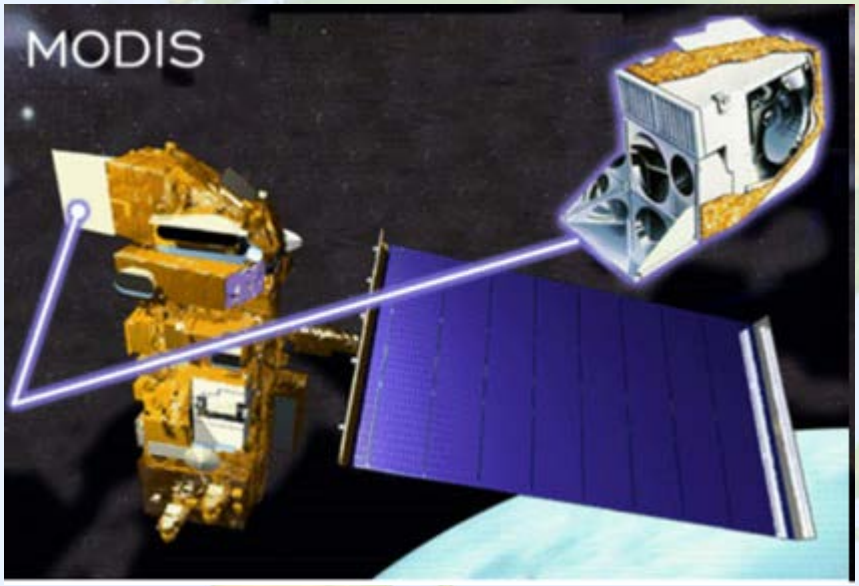
Satellite Imaging: More Than Just Pictures

- Visible image
  - High resolution (~0.5 - 2 m)
- Multi-spectral
  - Lower resolution (~20 m)
  - Fire sensing requires only ~10-50 m resolution
- "Remote sensing" using cloud and canopy piercing radar



The Satellites

- Mostly commercial
  - Military doesn't share images and data
  - Privately owned
  - Sell images for profit
  - ~$100M investment
  - Expensive to operate



- Lifetime of years, with planned replacement
- Some control over its course
  - Requesting specific locations costs even more
- Surface coverage is variable

Eyes on Darfur

www.eyesondarfur.org/

- In 2006, Amnesty International USA (AIUSA), and the American Association for the Advancement of Science (AAAS) used satellites to record irrefutable evidence of destruction in Darfur
  - High-resolution satellite imagery provides unimpeachable evidence of the atrocities being committed in Darfur
  - Enables action by policy makers, international courts, and private citizens
- Created the Eyes on Darfur project
  - Broke new ground in protecting human rights by allowing people around the world to literally “watch over” Sudan
  - Focus to protect twelve intact, but highly vulnerable, villages
  - Only 2 were destroyed: generally considered a success

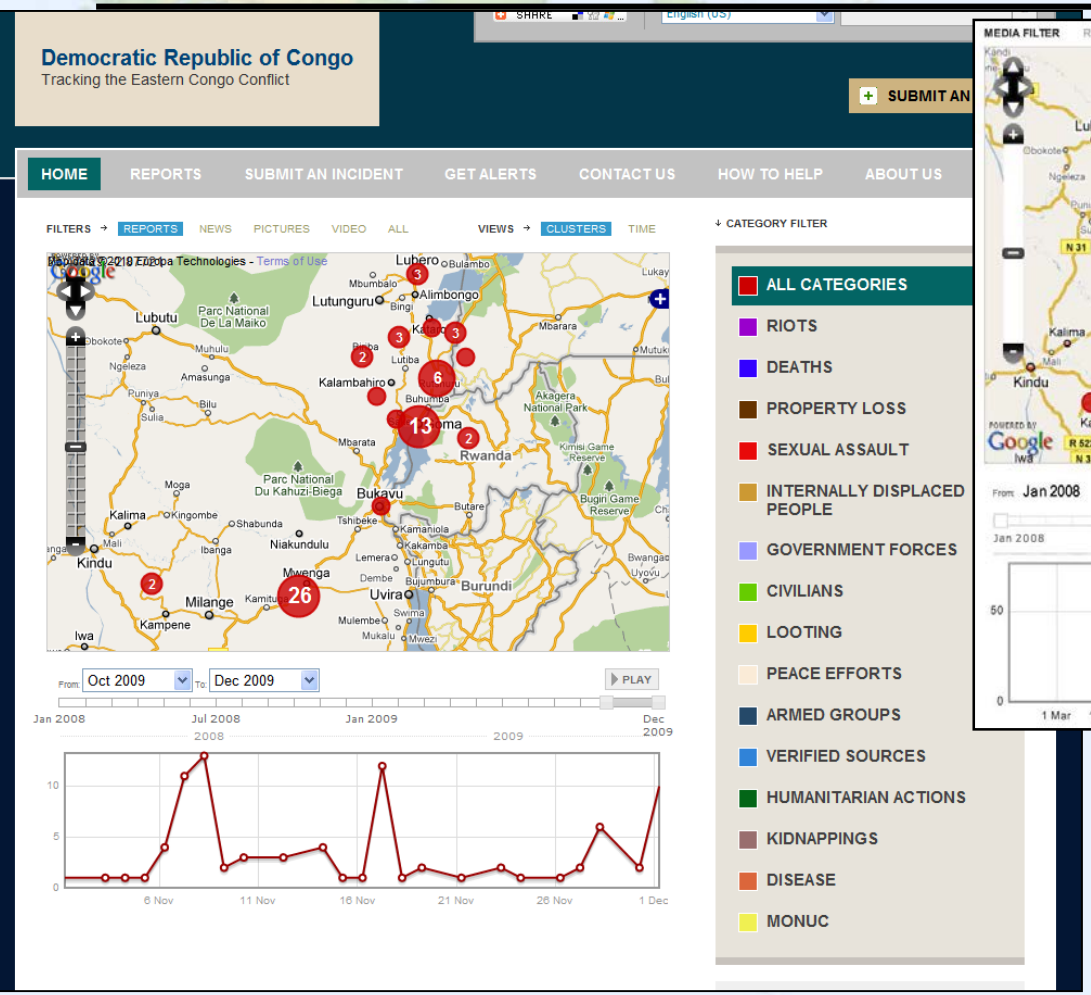
Crowd Sourcing: Amplifying Voices

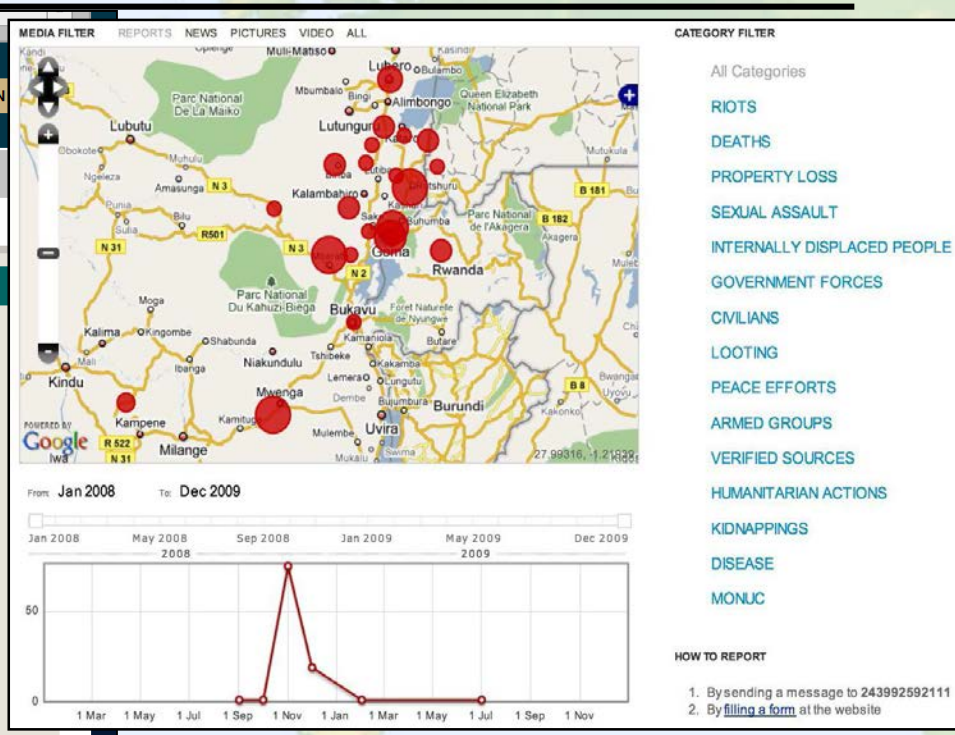
- 1000 anecdotes is worth a solid piece of evidence
  - Humans coding news stories about perpetrators, victims, timing, and methods
    - E.g., Eyes on Pakistan
  - 1000 people predict conflict better than computer models
  - Statistical aggregation of thousands of human stories is more accurate than computer models in predicting conflict
- Cell phones are great
  - SMS and cameras are everywhere, even in poor countries
  - Weapons of mass documentation
  - Encryption: Blackberry and Saudi Arabia
- GPS locating
- Examples
  - Finding secret prisons in Eritrea
  - Feeding crowd-sourced information in real time to women's shelters

Crowd Sourcing Tools

- Must be careful
  - Access codes for authenticity
  - Verification: protect against manipulation
  - Can sometimes inflame further violence
- Ushahidi
  - Uses secret codes: must be set up ahead of time
  - Hides information from perpetrators: protects sources
- Martus
  - Encrypts longer narratives
- Benetech: non-profit development for human rights
- AIUSA working to merge data sets
  - Combining real-time crowd-sourcing with data visualization

Ushahidi (and similar) Systems: Amplifying Voices

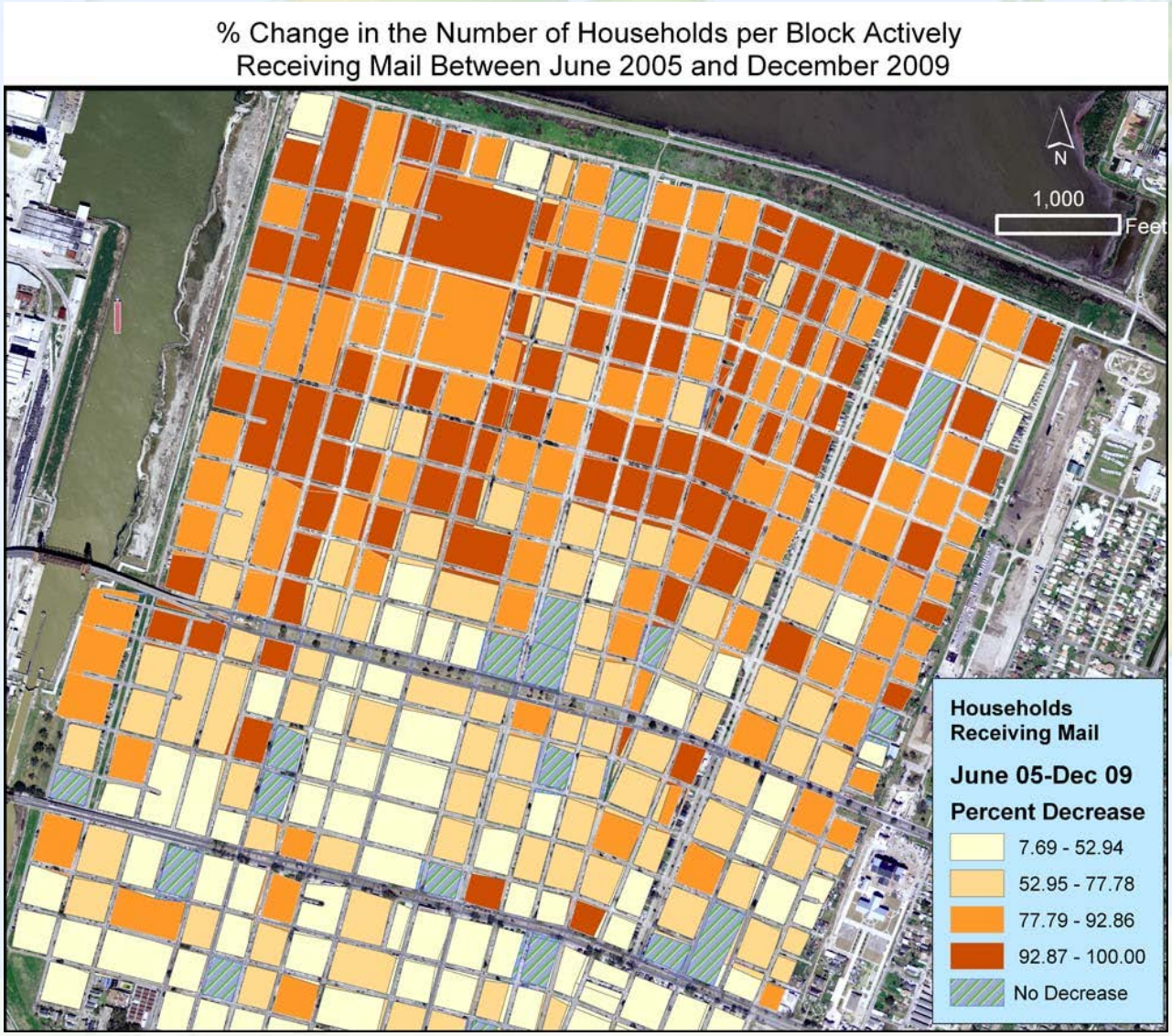




In places such as Haiti or DRC, individuals can securely report isolated events

Groups with no servers can still set up their own mapping center.

Alternative Data Streams (Data Mining)



- Lagging Reconstruction in the New Orleans lower 9th Ward, as indicated by Postal Delivery records

Computational Analysis Tools

Artificial intelligence

Conflict models

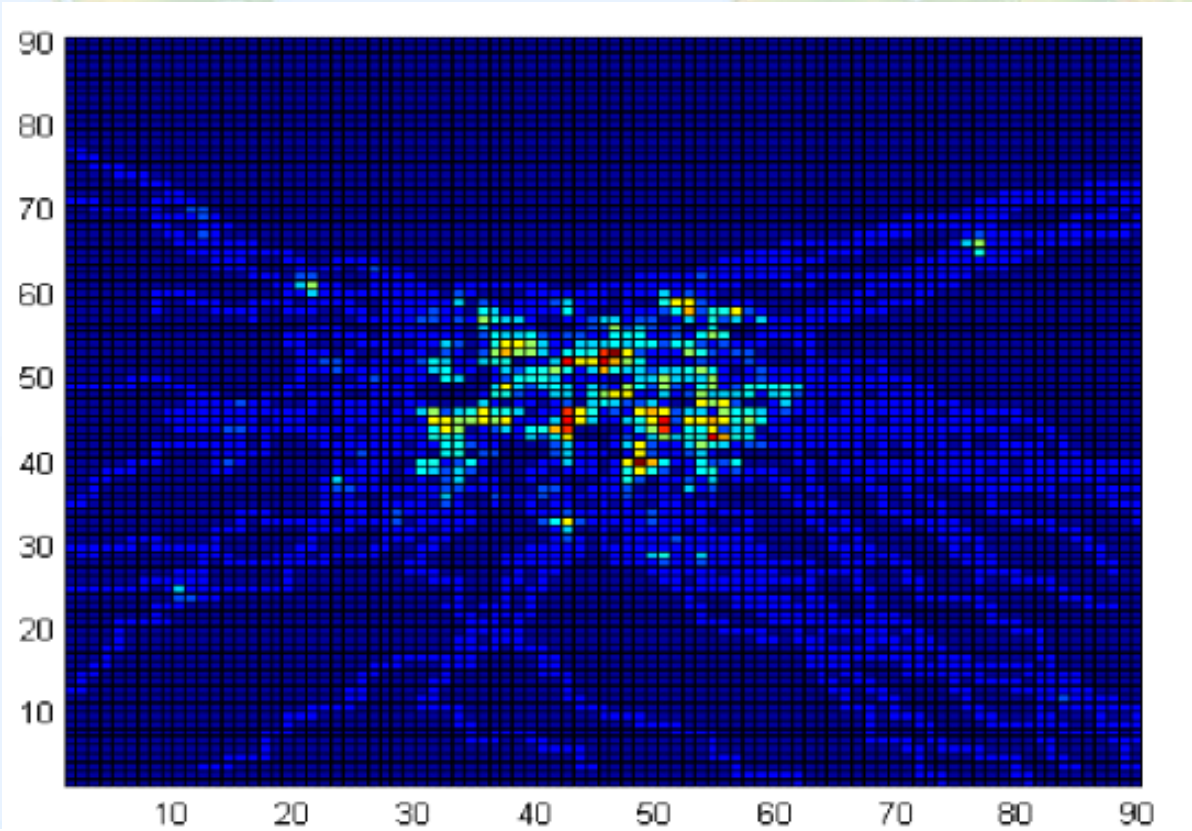
Migration models

Automated Image Recognition

- Only crude algorithms available, as yet
  - Computationally expensive
- Computer selects candidates
  - Requires human intervention on each image for confirmation
- Miss rate not well known

Crisis Early Warning and Risk Analysis

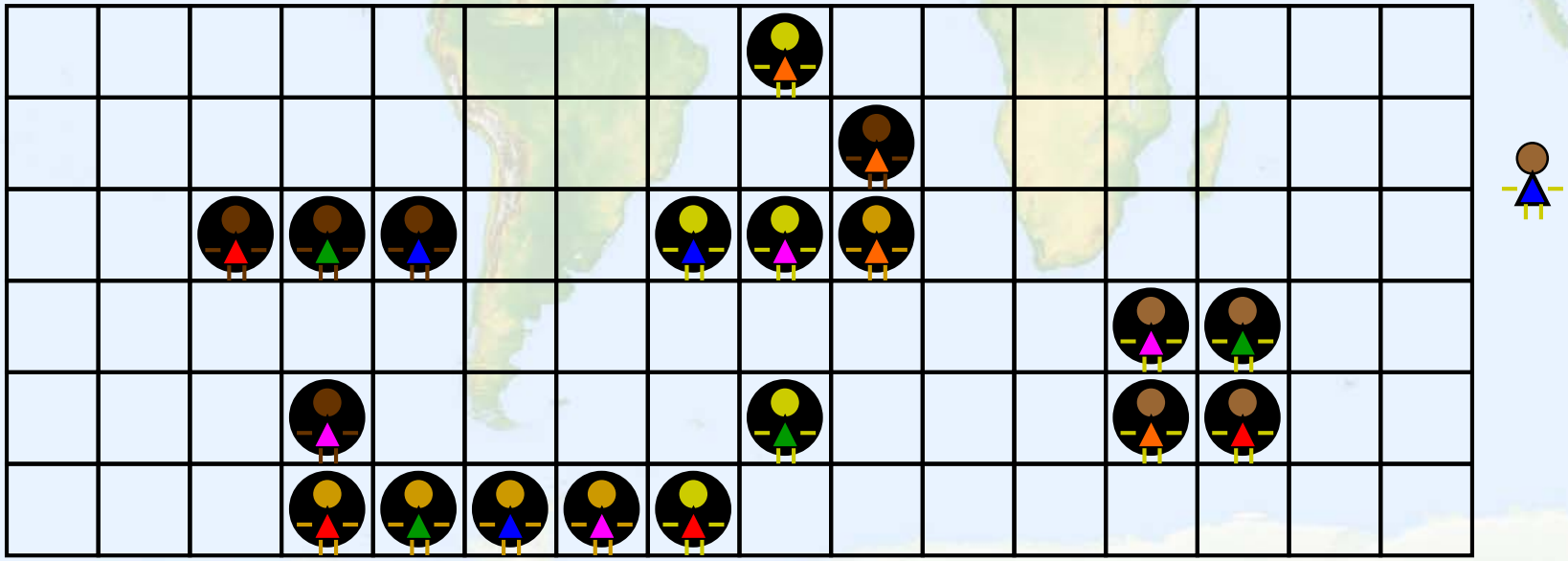
$$\iota^{\sigma=1} \cdot \iota^{\eta\to 1}\left(\frac{u\to 1}{D(c)}\right) \geq \iota^{\sigma=2} \cdot \iota^{\eta\to 2}\left(\frac{u\to 2}{D(c)}\right)$$



Scott Edwards, *The Chaos of Forced Displacement*, 2008

Agent Based Models

- Like John Horton Conway's game of "Life"
- Only with terrain
- And intelligent life
- And real human consequences



Data Visualization

Web-based

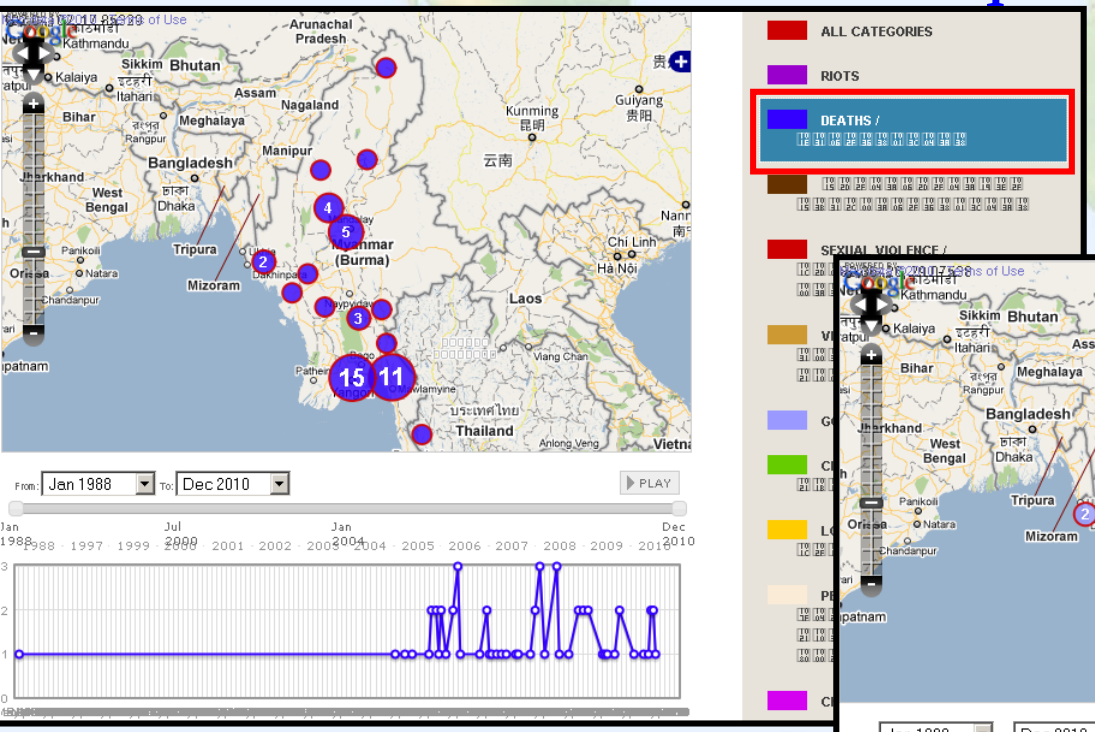
User Customizable

Data Visualization

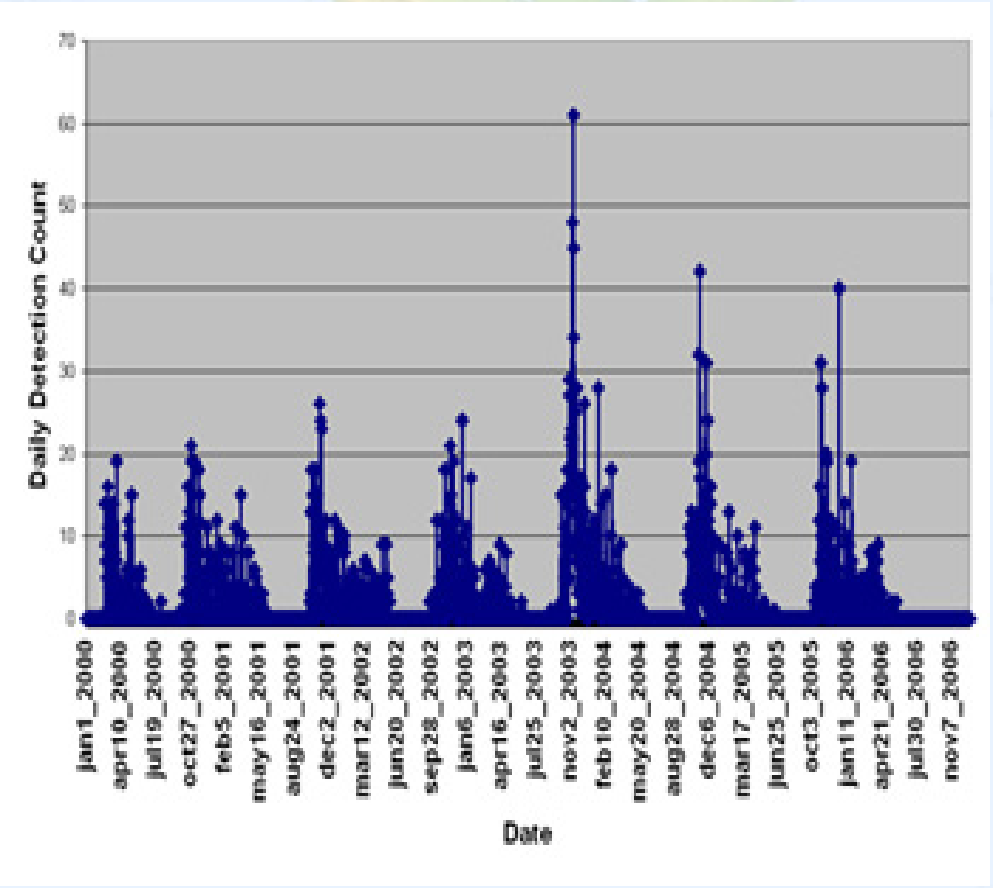
- Geospatial mapping
  - Like Google maps
  - Only much more serious

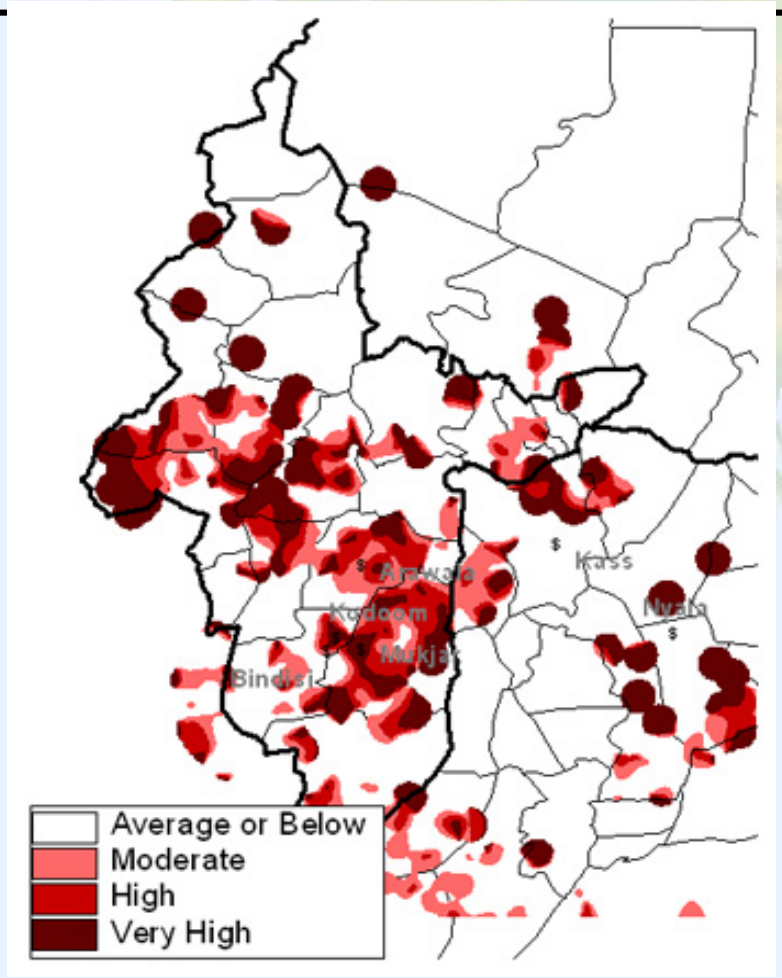
User Selectable Filtering and Combining

- Helps policy makers see the need
- See trends with time sequence images



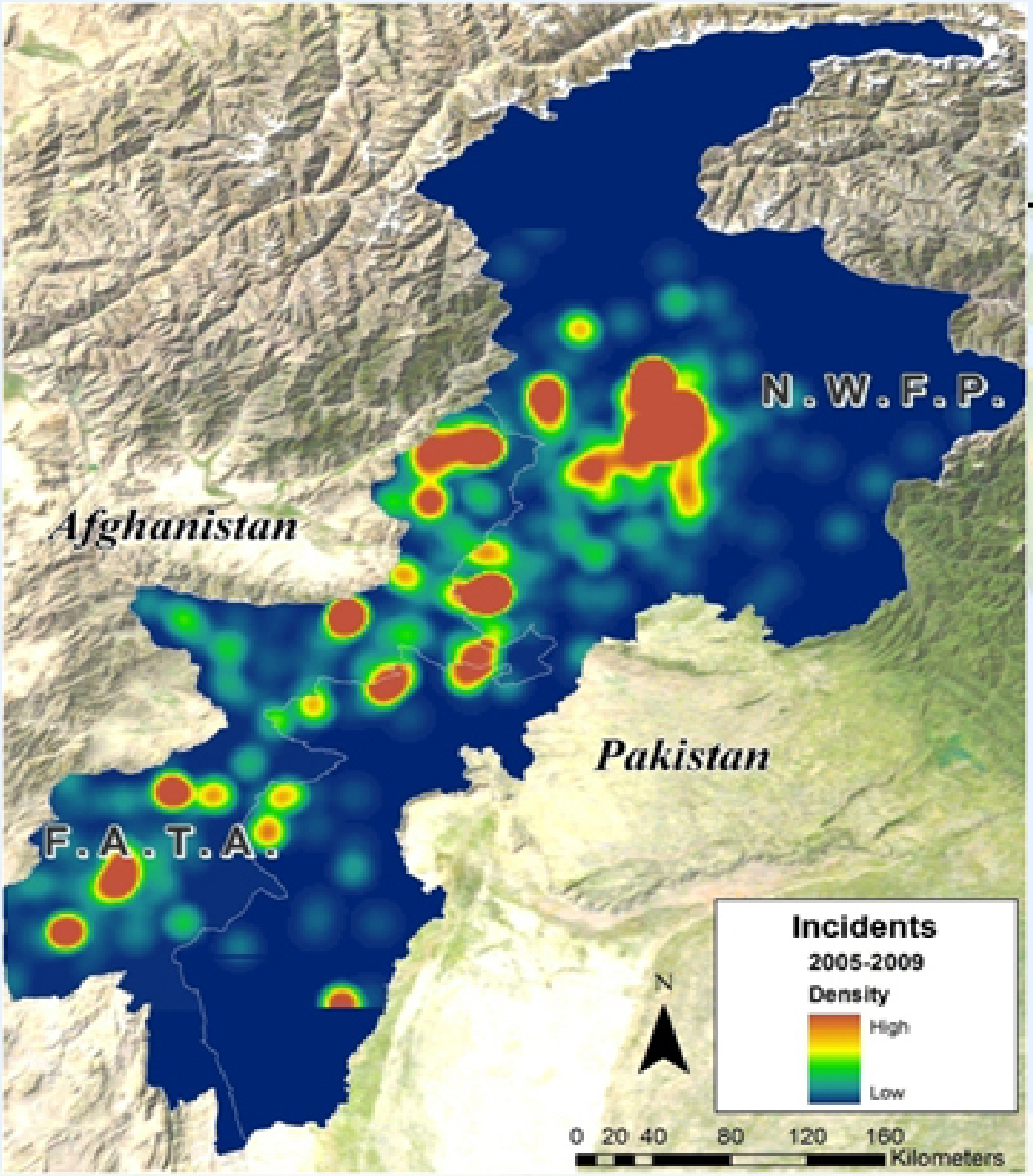
Better Tools, Better Analysis: Patterns and Trends (Lars Bromley, AAAS)





Average Daily Fires in Darfur, Sudan Before and During Government Offensives

Patterns and Trends



"Eyes on Pakistan"
www.eyesonpakistan.org

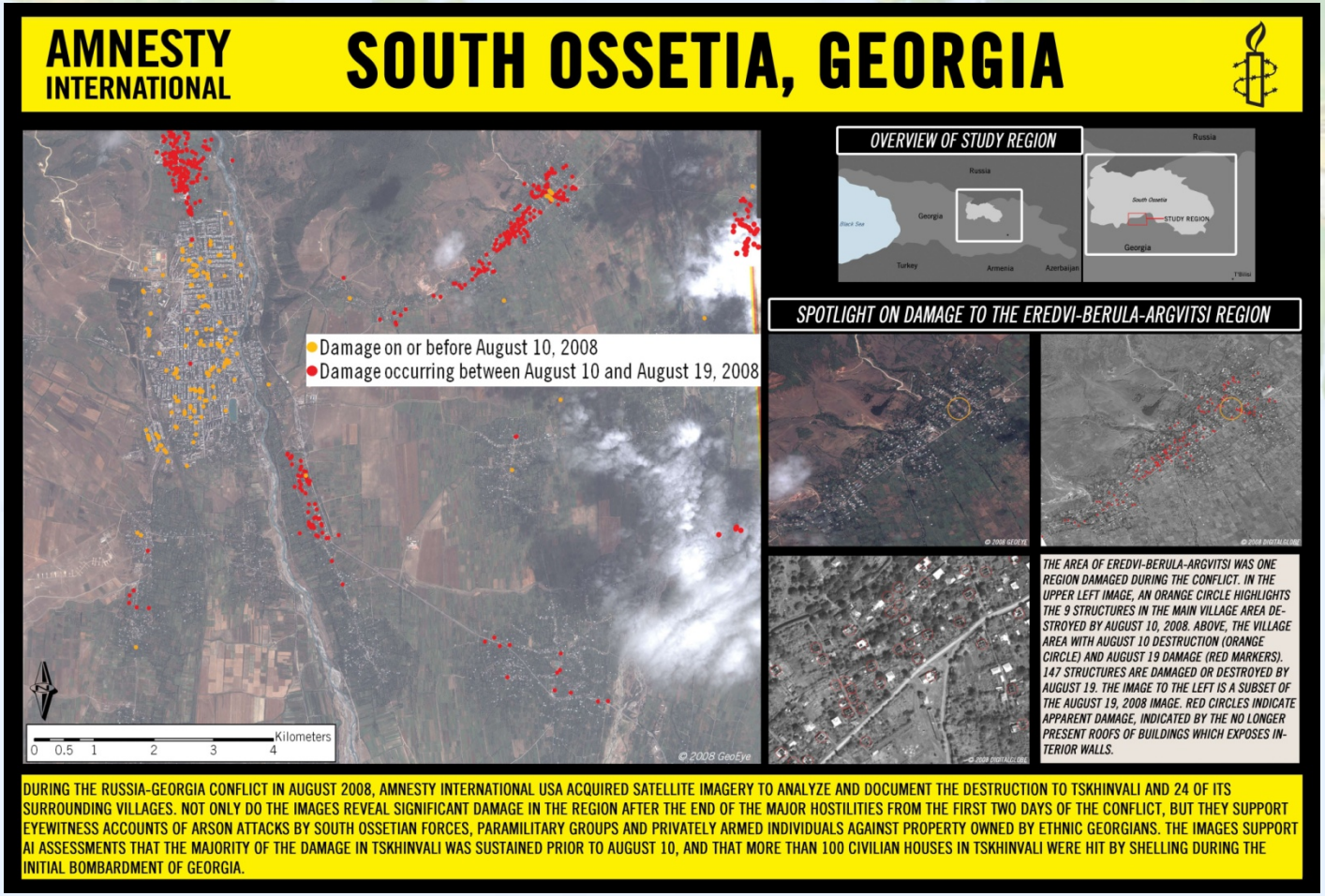
Geospatial Technologies

- Geospatial Technologies is a general term for information that is assigned to specific locations on earth
  - It is well-developed in environmental science, conservation, humanitarian relief and many other sections
  - Emerging re-application to human rights.
- It comprises a wide range of technologies, methods and tools
  - remote sensing
  - geo-positional tools (GPS)
  - mapping

Geospatial Technologies (2)

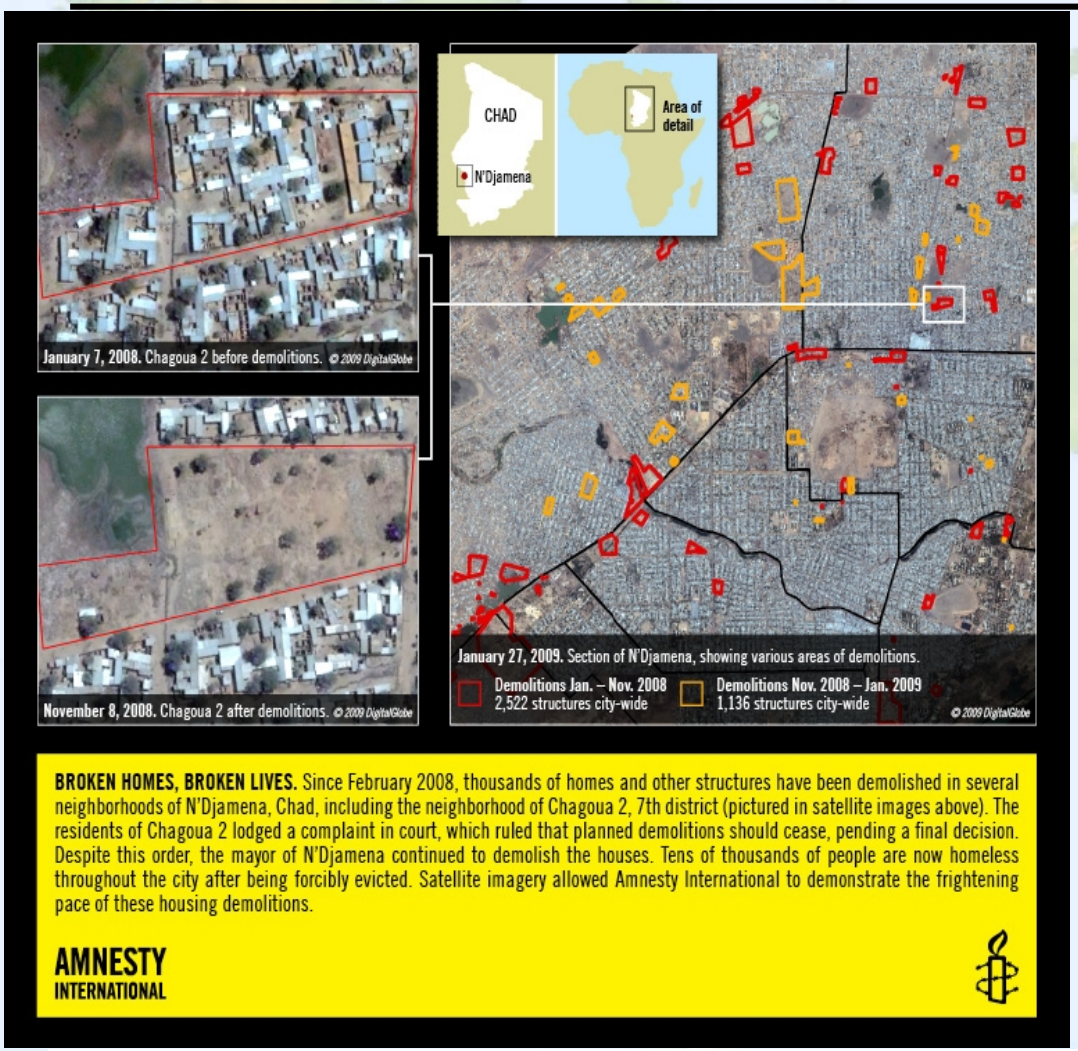
- GTs have been used to assist in documentation and research
  - producing hard evidence
  - refuting false claims.
- It has more recently increased the ability to monitor and protect populations at risk
  - producing advanced warnings of crisis for prevention methods
- Lastly, the information can be shared to stimulate activism
  - providing visual access to restricted areas within certain countries
- Support for Amnesty International work:
  - Currently a grant from the Oak Foundation (www.oakfnd.org/)
  - Shared with our science partner - AAAS's Science and Human Rights Program (shr.aaas.org/)

Research in Crises: Collecting Information Before it Disappears



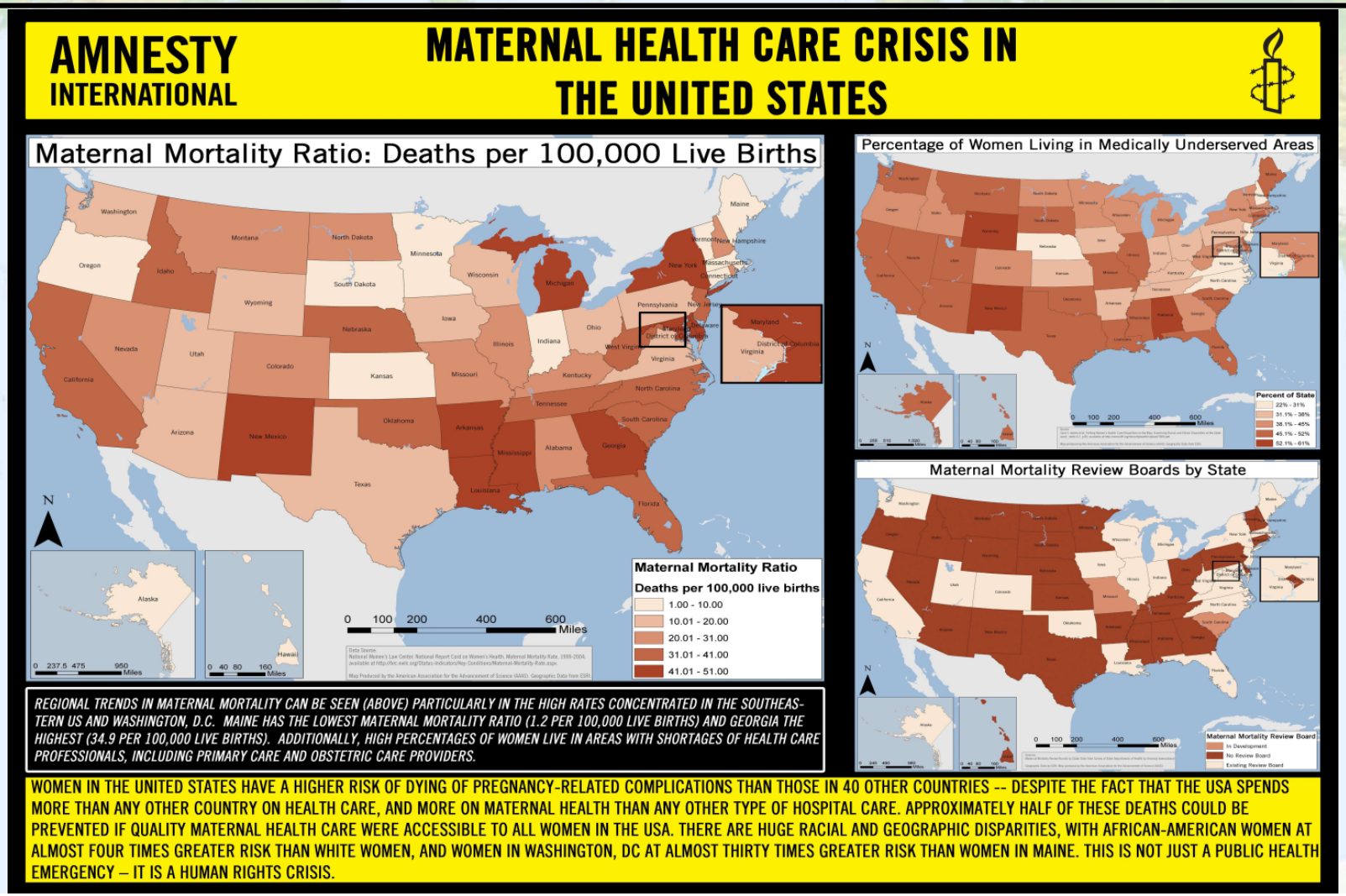
Damage to civilian infrastructure during Georgian control compared with Russian occupation

Systematic and Comprehensive



Satellite imagery allowed Amnesty International to demonstrate the frightening pace of housing demolitions in Chad

Data Accessibility



Mapping of large-n data associated with “Deadly Delivery”

Demonstrating Scope and Severity

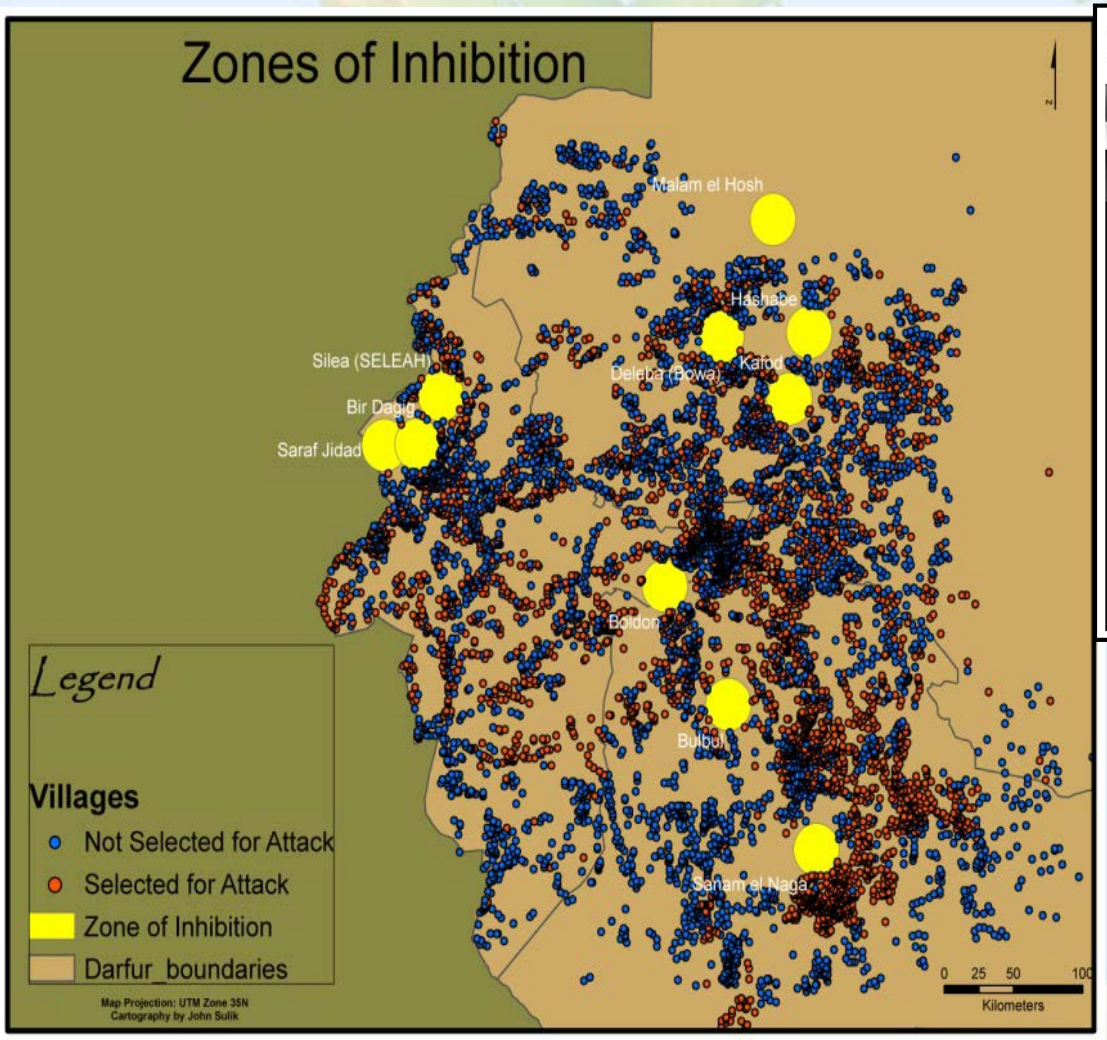
www.amnestyusa.org/science/explore/

The Porta Farm community in Zimbabwe,
before and after politically-motivated forced evictions.
After two years, nearly no trace of former community.

Documenting Severity: Lebanon

www.amnestyusa.org/science/explore/

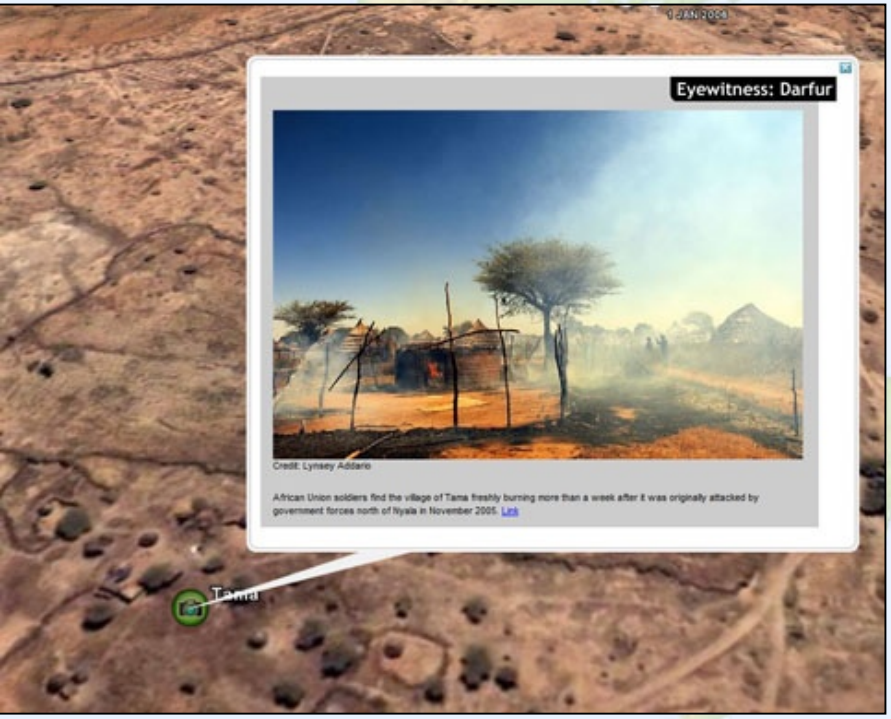
Advocacy: Early Intervention and Prevention



Impact Analysis of "Eyes on Darfur" protective sites

www.eyesondarfur.org

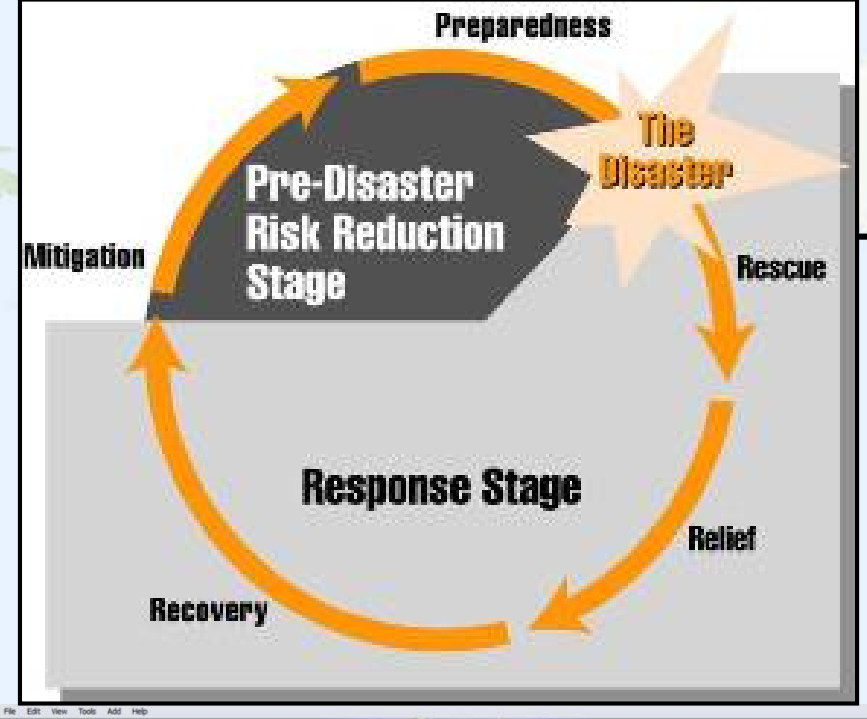
Bringing Research Materials to Life

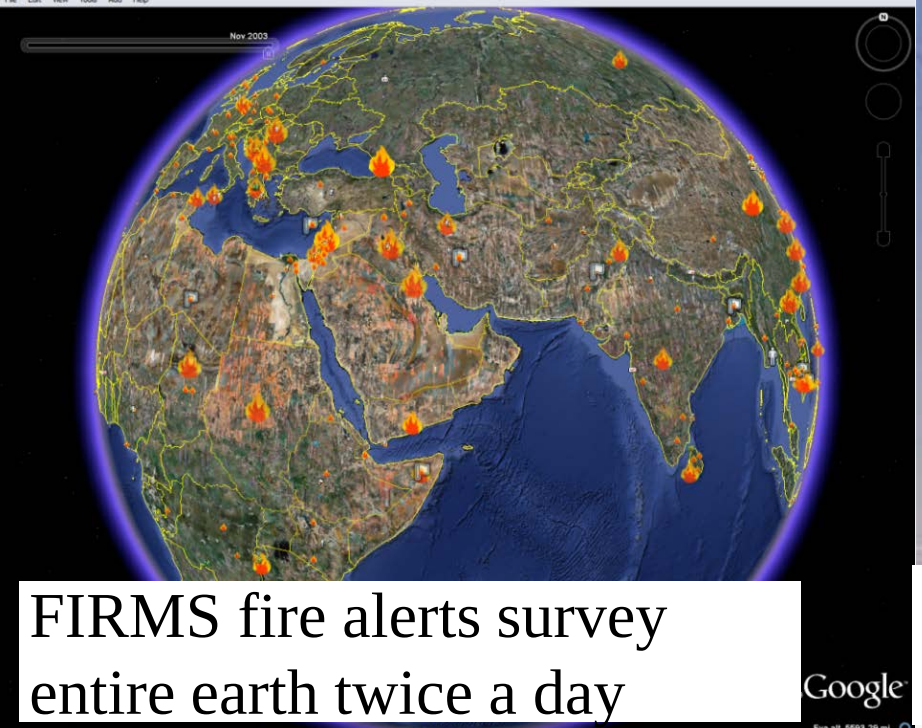


Tama, a town in S. Darfur, following an attack by government soldiers in 2005.

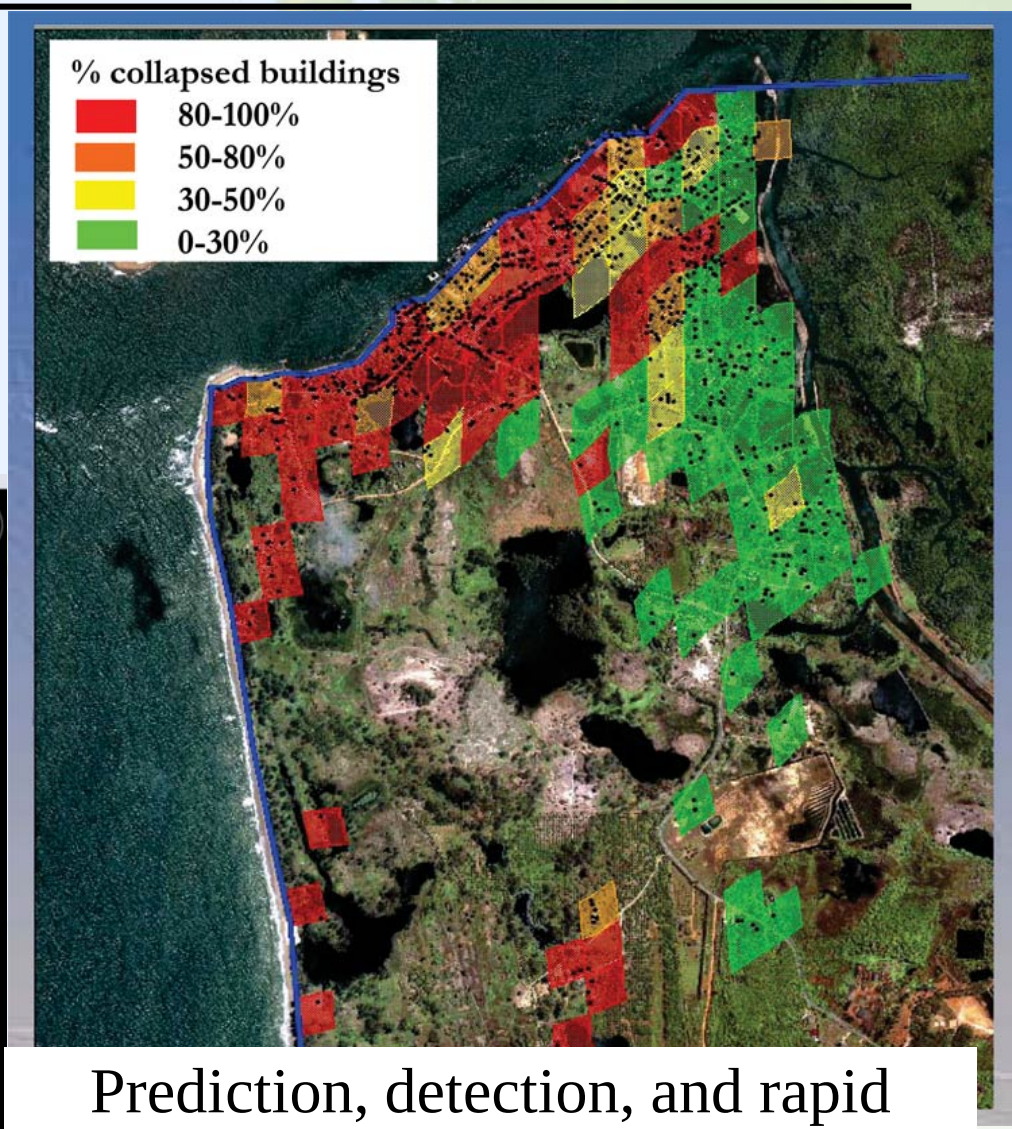
Eyewitness testimony from Kutum, in N. Darfur, following a Janjawid attack.

Breaking Crisis Cycles



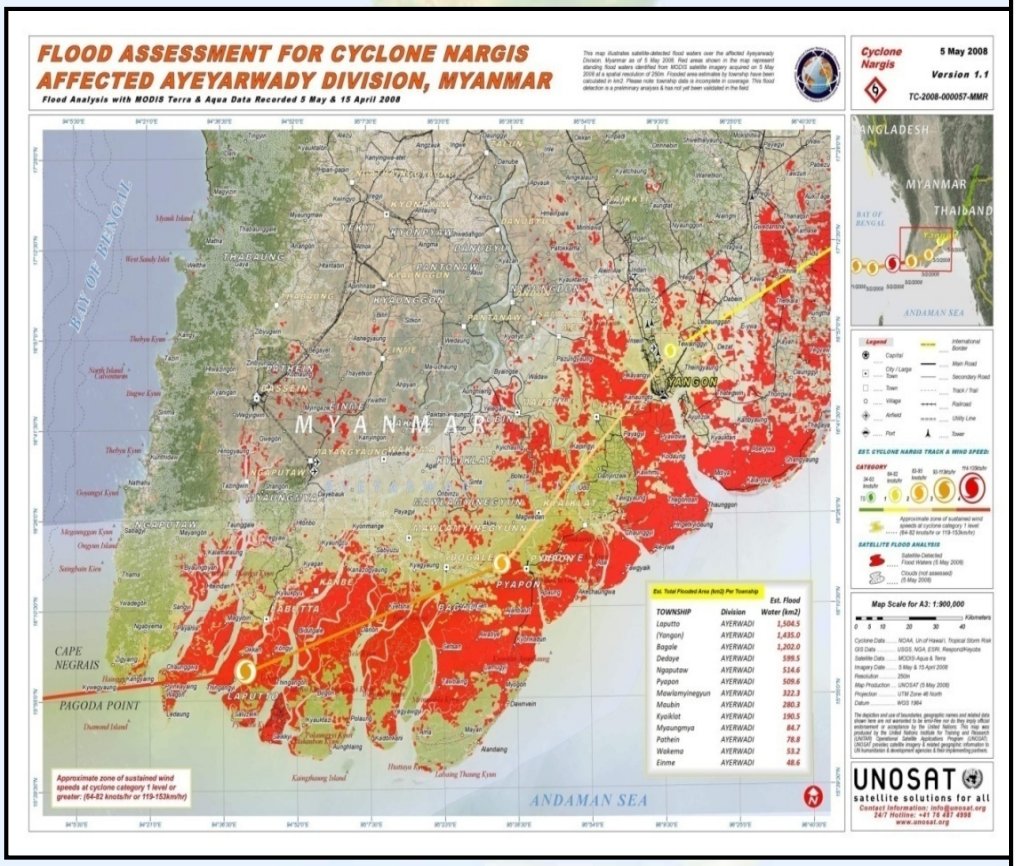


FIRMS fire alerts survey entire earth twice a day

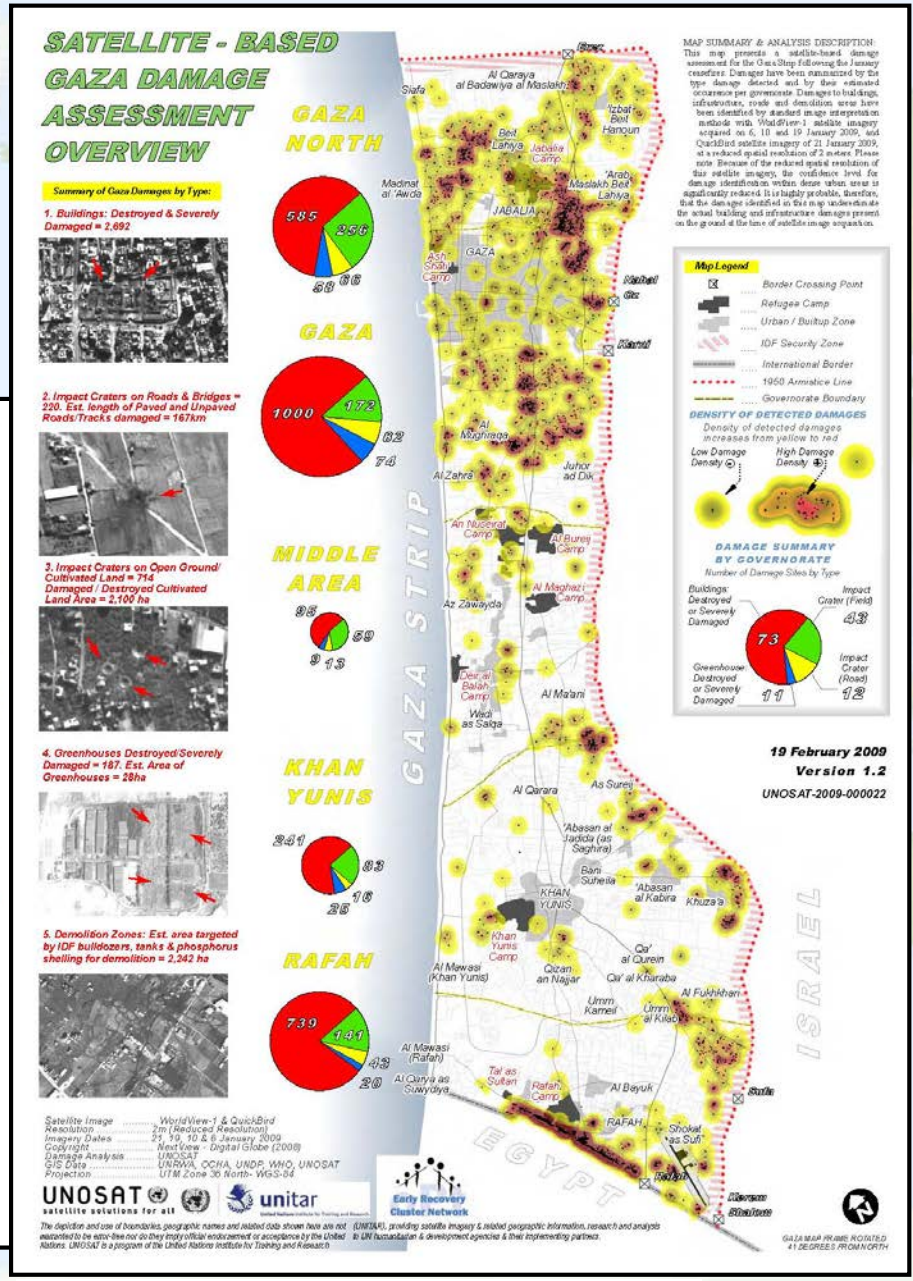


Prediction, detection, and rapid response

Setting the Human Rights Agenda in the Context of Disaster



UNICEF: Access to relief



UNICEF: in Gaza

Training and Education

System Administration

Reporters

Rules of Evidence

Engaging the Public

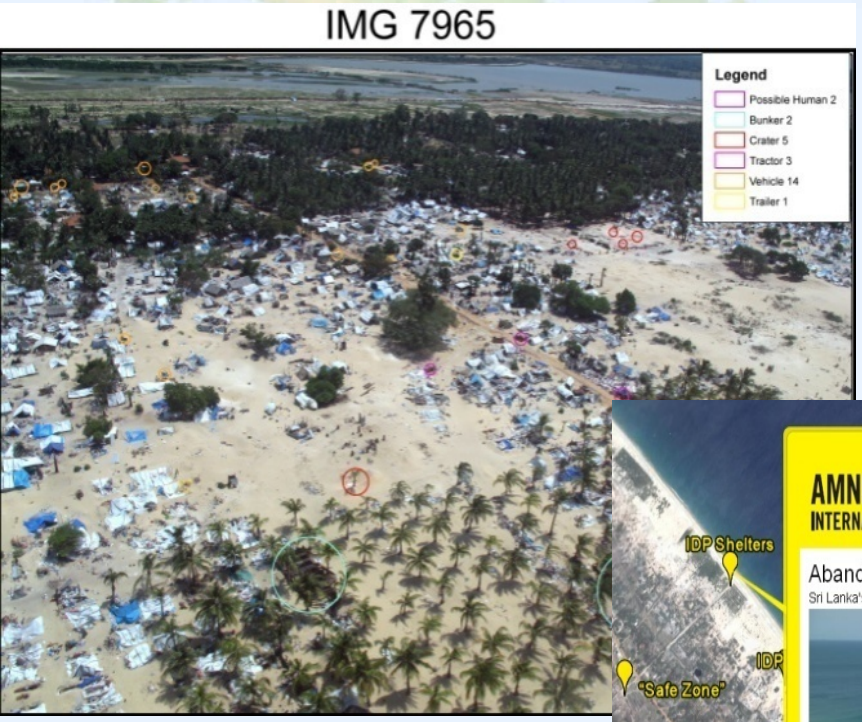
Administrators and Reporters

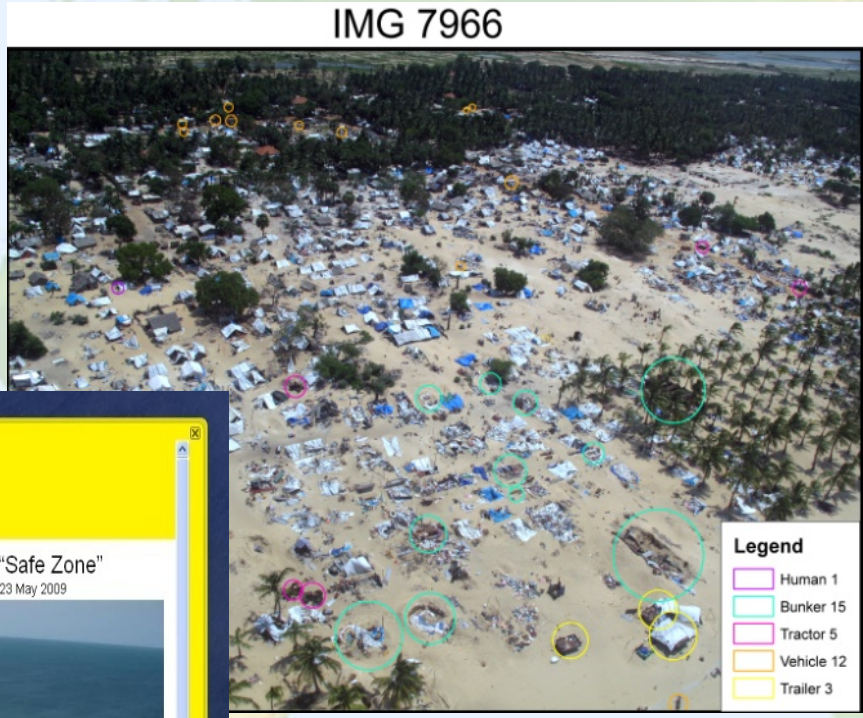
- Administrators: Information Technology (IT)
  - Setup and run a data center
  - Reporter and user technical support
  - Information source secrecy and access
    - Can be complicated
    - Can sources be permanently anonymous?
- Reporters
  - Manage passwords
- Rules of evidence
  - For both administrators and reporters
- AI SHR staff trained administrators in Uganda and Kenya

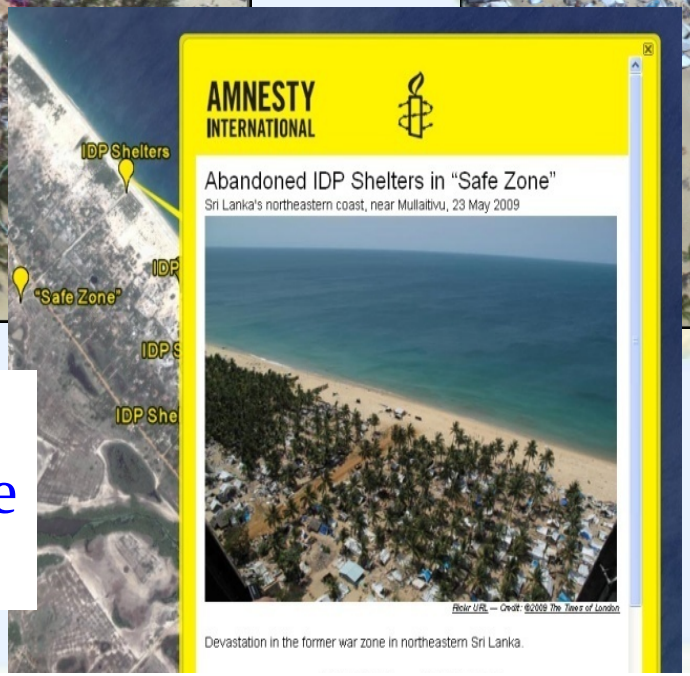
Mission Planning and Support

- AIUSA's SHR staff work with International Secretariat researchers to help plan and support field work.
  - Equipping mission teams with technology
    - geopositioning tools
    - satellite communications
    - digitized base maps of unfamiliar and previously unmapped areas
  - While on the ground, coordinate with teams to
    - identify potential HR abuses
    - contextualize local reporting and testimony

Engagement and Awareness: Helping the Public to Explore







Images from helicoptor and satellite put on Google earth

AIUSA's Google Earth views during the Sri Lanka crisis

Economic, Social, and Cultural Rights (ESCR)

Cultural Differences

Cell Phones

Reproductive Rights

Economic, Social, and Cultural Rights (ESCR)

- Cultural differences are huge
  - Much bigger than most Americans realize
- Cultural rights is an extremely sensitive topic
- Where does culture end, and abuse begin?
  - What if the supposed victim agrees that the practice is appropriate or desirable?
  - What if the supposed victim is a child, and cannot give informed consent?

Reproductive Rights

- Birth Control
  - Pills
    - Spousal consent
  - Implant
  - Skin patch
  - Education for informed choice: side effects
- Abortion
  - Spousal consent
- Sterilization

Coming Soon…

- Using remote sensing to:
  - Detect gas flaring, home demolitions, and violations of International Humanitarian Law in the Niger Delta
  - Access displacement camps surrounding Mogadishu
- Use Automated Data Collection to:
  - Develop models for a comprehensive human rights crisis early warning system
  - Respond to crises through direct, “crowdsourced” information
- Use geovisualization techniques to:
  - Increase engagement with activists and policy makers
  - Use participatory Geographic Information Systems (GIS) to find and expose secret detention facilities

Are Cell Phones a Human Right?

- Are cell phones an economic right?
  - Huge quantitative and qualitative economic advantage
  - In many regions, cell phones are key to the “right to work”?
- Key to reporting and documenting abuse
  - Camera, video, and GPS
- Almost have to ask: In today’s world, Are cell phones a human right?

The Next Boundaries

- Improving computational modeling reliability
  - Forecasting Crises
  - Predicting refugee migration routes
- Artificial Intelligence Systems
  - Damage recognition
- Integrated, purpose-built systems
  - Easy to set up
  - Easy to use
  - Secure

“When Elephants Fight, the Grass Gets Trampled”

- AAAS is a standing partner with AIUSA under the OAK Grant
- AAAS works with other organizations, too
- Scott Edwards: ½ SHR Directory, ½ Advocacy Director for Africa