Center for American Progress

New Tools for Old Traumas

Using 21st Century Technologies to Combat Human Rights Atrocities

Sarah K. Dreier and William F. Schulz   October 2009

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Prologue

In his classic work of philosophy, *Being and Nothingness*, Jean-Paul Sartre reflects on the phenomenon of shame. Shame, he says, always require an "Other."

> *I have just made an awkward or vulgar gesture… I neither judge it nor blame it. I simply live it… But now suddenly I raise my head. Somebody was there and has seen me. Suddenly I realize the vulgarity of my gesture, and I am ashamed… I am ashamed of myself as I appear to the Other… Nobody can be vulgar all alone! The Other has… revealed to me what I was…* [1]

Some people, certainly, feel no shame at their evil deeds. A few even want their criminal prowess to be widely known or their vengeful acts to serve as signs of their power or warnings to their enemies. But human rights advocates have always relied upon the curious fact that most violators of human rights, even the most brutal, prefer to work their wickedness behind closed doors. Some may feel the kind of shame Sartre identifies; others may hide their crimes for fear of ill consequences, such as international opprobrium or prosecution. The U.S. military, for example, was hardly eager to have the shocking photos of abuses at the Abu Ghraib prison in Iraq advertised to the world. [2] Whomever the perpetrators and whatever their motives, their adversary is exposure.

Advances in information and communications technologies have helped human rights activists be Sartre's "Other." The American civil rights movement was bolstered by the shocking television images of Bull Connor's dogs attacking peaceful demonstrators in Birmingham, Alabama. Amnesty International's letter writing campaigns of the 1960s and 70s, successful as they were, grew even more powerful when letters could be supplemented by faxes and then emails, flash animation, and online organizing.

Thanks to today's scientific and technological resources, there now exist unparalleled opportunities to expose human rights abuses. And with the knowledge generated by these new capacities for exposure, human rights champions have new opportunities to intervene to stop ongoing abuses, provide redress to victims, identify perpetrators and bring them to justice, and—by sending the message that the world is watching—even prevent abuses from taking place in the first place.

This is not to say that the struggle for human rights is easy nor that technology provides a panacea. There are certainly limits to technology's capacity to promote democracy or combat human rights abuses, and such tools in no way supplant the ongoing need for direct action.[3] Indeed, some abuses are not susceptible to repair by technology. But many deviations from human rights standards—standards that are articulated in the Universal Declaration of Human Rights and scores of subsequent treaties, conventions, protocols, and court rulings—certainly may be. These include some of the most serious, such as mass atrocities, and they certainly include violations of social and economic rights, such as the right to food, health care, and education.

One of the challenges facing this new work is that there exist notable tensions between the "cultures" of the science and human rights communities. Human rights work is inherently political. Scientists, in contrast, guard the objectivity of their work closely and are often upset when political interpretations appear to distort their findings. It is nonetheless possible for human rights workers focused on political objectives to collaborate with researchers who continue to produce work that adheres to the highest levels of professional objectivity. Indeed, the two communities are reaching out to each other in a delicate process that American Association for the Advancement of Science geographer Lars Bromley refers to as "flirting, dating, and then marriage."[4] This report details many of the successful fruits of that marriage and points to new ways to foster those collaborations.

Some might argue that, given human rights abuses committed by or at the behest of the United States, it makes no sense for human rights advocates to engage the U.S. government as a partner in their work. Many human rights organizations will not take government money for fear that it will be perceived as compromising their independence or ability to criticize a donor. We respect this position. But, like it or not, American human rights leadership is crucial to the global success of the human rights cause.

President Barack Obama's dual commitments to support to international human rights standards—made clear, for example, when the president reversed President George Bush's policy of refusing to seek a U. S. seat on the U.N. Human Rights Council—and to scientific advancement make now the perfect time to develop a robust U.S. human rights and technology program that takes advantage of new technologies to document abuses, bring perpetrators to justice, and take steps to prevent human rights crimes from happening in the first place.

Introduction and summary

Steady increases in technological sophistication over the past 10 to 20 years have helped millions of people come a bit closer to realizing social and economic rights such as the rights to food, clothing, housing, and medical care. These technological advances are also having a major impact on the struggle for civil and political rights.

The rapid expansion of computing and Internet capacities, for example, has increased information flows, making them more sophisticated, faster, and cheaper than ever before. That in turn has allowed governments, activists, and citizens to gather unprecedented amounts of information about human rights violations and disseminate it widely—and instantly— around the globe. Cell phones with photo capabilities convey images of human rights violations at a moment's notice. Internet social networking tools enable activists to connect with one another and with sympathetic audiences to build worldwide networks for change. Electronic data analysis tools allow for vast amounts of information about human rights crimes to be collected and analyzed, helping legal teams verify and synthesize evidence that would otherwise be too scattered and voluminous to be useful in a court of law. Satellite imagery is now so precise that it can reveal damage to individual village infrastructures at meter-scale resolution. And advanced DNA forensic techniques can help identify hitherto anonymous victims hidden in mass graves.

Yet there are still significant barriers for using many of these technologies to promote a human rights agenda. One is simply that many actors lack necessary access to the existing tools. Satellite imagery is expensive and logistically difficult for human rights organizations to come by. Authoritarian regimes around the world continue to restrict comprehensive Internet service, block cell phone service, and prohibit cryptography software that would safeguard reports of abuses and protect the identities of witnesses who provide that politically sensitive information. There is still a notable "digital divide" between privileged countries and the developing world, leaving huge expanses without reliable Internet or cell phone service infrastructures.[5] And U.S. government agencies are not well organized to utilize these technologies themselves for human rights purposes or to help NGOs or local communities do so.

There are several key steps the U.S. government can take to encourage the application of new technologies to stop human rights abuses, including:

- The White House Office of Science and Technology Policy can sponsor an initiative on technology and human rights.
- The President's Council of Advisors on Science and Technology can incorporate human rights commitments into its agenda.
- Appropriate government agencies can facilitate new public-private partnerships between federal agencies and corporations to advance human rights.
- Congress and the administration can increase funding for scientific research and technology development that link to human rights.
- The National Science Foundation can require human rights Impact Statements in appropriate NSF grant proposals.

There are also a host of specific things that the U.S. government, companies, and NGOs can do to bolster and expand existing applications of science and technology in the human rights arena.

Satellite imagery: High-resolution satellite images provide evidence of destroyed villages, mass graves, and secret prison camps. Advocates and international legal institutions can use these images to place political and legal pressure on regimes responsible for such crimes. The U.S. government can increase the effectiveness of satellite imagery to document abuses by updating publicly available mapping databases, increasing NGO access to commercial satellite imagery, and strengthening cross-agency partnerships.

Databases and document management: Advanced database software systems allow victims, activists, and local NGOs around the world to upload copious amounts of data that document human rights abuses securely and then sort and analyze it to quantify broad trends that are meaningful in a court of law. The United States can help make these tools more readily available to local actors by placing international pressure on authoritarian regimes to lift restrictions on cryptography.

Medical forensics: DNA and other medical forensic techniques can provide essential information about the identities and causes of death of victims of human rights crimes. The U.S. government can support important fact-finding efforts around the world by committing not to obstruct such inquiries—and, indeed, to help advance them—no matter who is the perpetrator

Social networking and other information and communication technologies: Cell phones, laptops, and Internet social networking tools have become essential vehicles for advancing free speech, reporting human rights abuses, and distributing health care and

other life-sustaining information. The U.S. government and U.S. businesses can dedicate resources to increasing wireless communication coverage and access to electronics hardware and software around the world. The U.S. government can also support U.S.-based Internet service providers in resisting censorship practices in authoritarian regimes.

As new technologies are discovered, new human rights applications will emerge. If the U.S. government is to be the global human rights leader its citizens want it to be, it will need to insure that human rights are a principal beneficiary of the development of cutting-edge innovations.

A promising partnership: Government, science, and human rights

There is no better time than this for the United States to invest in scientific research and technological development to advance human rights.

President Obama recognized in his inaugural address the essential role that science and technology will play as our nation and world address the most pressing issues of the 21st century, including climate change, health care, and education.[6] Less than two months after he took office, the president lifted the ban on federal funding for embryonic stem cell research in order to advance research for curing devastating diseases. He also signed a presidential memorandum to restore scientific integrity to government decision making, announcing that, by basing public policies on the soundest science, "we will harness the power of science to achieve our goals—to preserve our environment and protect our national security; to create the jobs of the future, and live longer, healthier lives."[7]

The president has backed up this commitment with his 2010 budget request, which calls for funding increases for several research agencies, including an 8.5-percent increase for the National Science Foundation. This request, along with other similar hikes in funding for scientific research and development, establishes a clear path to completing the government's efforts to double funding for scientific research by 2016.[8]

President Barack Obama set an additional goal in his speech to the National Academy of Sciences that the United States would devote more than 3 percent of its gross domestic product to research and development. This number exceeds the level achieved at the height of the Cold War space race and "represents the largest commitment to scientific research and innovation in American history." This includes investing in basic and applied research, creating new incentives for private innovation, promoting breakthroughs, and improving education in math and science.[9]

The president is not alone in his enthusiasm. Speaker of the House of Representatives Nancy Pelosi has echoed President Obama's commitment to restore science to its rightful place as a central American policy priority, saying, "If you want to know the agenda for this Congress, think of four words: science, science, science, science." And Congress dedicated significant funds from the American Recovery and Reinvestment Act to science—$3 billion in additional funds to the NSF, for example, to support science and innovation and to ensure a better standard of living for today and for future generations.[10]

These decisions are beginning to reverse the steady decline in funding for science and innovation that has characterized the last several decades. Federal funding in the physical sciences fell by nearly half over the past quarter century as a portion of GDP. But new commitments to technological advancement send a clear signal that science and technology play essential roles in securing the common good for all Americans by providing new solutions to food shortages, epidemics, the provision of basic health care, and the risks posed by climate change. Now is the time for the Obama administration and Congress to make the application of science and technology to human rights abuses a similar focus of their support for innovation.

The new administration has taken a number of important steps to reverse the decline in America's reputation for human rights leadership during its first months in office. The president has promised to close the prison camp at Guantanamo Bay and has issued an executive order prohibiting torture, and the United States has rejoined the U.N. Human Rights Council.

The administration has also adopted a variety of innovative initiatives to take advantage of 21st century technology to improve government transparency, connect directly with Americans and other populations around the world, and provide a platform for individual voices to be heard.[11] Secretary of State Hillary Clinton has initiated so-called "21st Century Statecraft," using information and communication technologies and social software to expand the operating definition of diplomacy from traditional government-to-government conversations to interactions between governments and people as well as people-to-people. The president released a video message to the Persian world in March acknowledging the beginning of their new year and the "common humanity that binds us together."[12] The same month, State Department officials used Twitter to dispel false rumors that Madagascar's recently ousted president, Marc Ravalomanana, had taken refuge at the American Embassy in Antananarivo,[13] averting a potentially serious crisis.[14]

The U.S. government can apply these same tools directly to its human rights agenda. In some important respects it already has. Federal agencies, including the State Department's Bureau of Democracy, Human Rights, and Labor, have funded efforts to utilize satellite imagery, forensic techniques, and other tools to advance human rights. But there are few government mechanisms in place to foster systematic collaboration between scientists and human rights workers or to encourage corporations to foster innovative solutions to human rights problems.

There is no formal home in the federal bureaucracy for any program that might advocate for the development of technological applications geared toward the enhancement of human rights. More importantly, access to tools, techniques, databases, and networks such as satellite imagery and naming databases are fragmented among multiple siloed agencies. This inadvertently creates obstacles to the best use of technology in the service of human

rights, especially by NGOs. And NGOs—which are often the truth-tellers and advocates for human rights—are critical to the success of human rights efforts around the world.

The federal government can take five overarching steps to promote science and human rights within the executive branch, and work with NGOs and corporations on deploying technology in support of human rights.

The White House Office of Science and Technology Policy, or OSTP, should sponsor an initiative on technology and human rights. Advances in science and technology have immediate applications for advancing human rights, and OSTP should therefore undertake an initiative on the direct application of scientific research and technology to human rights. This initiative could include a White House conference that examines questions such as how to address restrictions on information and communication technologies and cryptography in authoritarian societies; how to increase NGO access to up-to-date satellite imagery; and how to use the host of innovative tools available to respond quickly to outbreaks of ethnic violence and mass atrocities.

The President's Council of Advisors on Science and Technology, or PCAST, should make a public commitment to incorporate human rights considerations into its agenda. PCAST, which makes policy recommendations in the areas where an understanding of science, technology, and innovation is key to advancing prosperity and security in the United States and the world, should make a specific commitment to human rights. It should examine its policy recommendations to insure that they promote the use of scientific research and technologies to protect and support human rights, eliminate barriers to such use, and facilitate cooperation and funding.

The Obama administration should facilitate new public-private partnerships between federal agencies and corporations to advance human rights. President Obama has vowed to create new incentives for private innovation as part of his administration's unprecedented commitment to invest in science and technology. The U.S. government should build on this commitment by helping facilitate collaboration between federal agencies, international institutions, private corporations, NGOs, and academics to better apply cutting-edge innovations and the technologies available in the private sector to human rights. The federal government could host a series of conferences that would bring these actors together to discuss science, technology, and human rights. It could also sponsor initiatives to design technology specifically applicable to human rights monitoring and encourage cell phone companies, telecommunication companies, satellite companies, and Internet service providers to find innovative ways to make their products more accessible to at-risk communities and human rights activists. Telecommunication companies could, for example, agree to wave transaction fees for text message-based donations made for human rights or other humanitarian efforts.

Increase funding for scientific research and technology development linked to human rights. The National Science Foundation is an independent federal agency that serves as the funding source for 20 percent of all federally supported basic research conducted by America's colleges and universities, the majority of which go to the physical sciences. The NSF can further invest in human rights by adding a "Human Rights" category to its index of funding opportunities and dedicating new funds for an interdisciplinary "Human Rights Challenge" grant program to fund scientific research and technology applications aimed at advancing human rights.

Require "Human Rights Impact" statements in appropriate NSF grant proposals. The NSF currently requires that all grant proposals include a "Broader Impact" statement that describes the effect that the proposed activities would have on broader social priorities, including the "ways in which the proposed activity will broaden the participation of underrepresented groups."[15] The NSF should similarly require "Human Rights Impact" statements for all appropriate grant applications that would assess whether the proposal could benefit the human rights agenda. Such statements would highlight the dual-use nature of many technologies and raise consciousness about human rights concerns generally among scientists and other researchers.

21st century technological tools and the struggle for human rights

Satellite imagery

The ruling junta in Burma (Myanmar), the State Peace and Development Council, is one of the most brutal governments in the world. It has, for example, destroyed 3,000 villages, primarily in eastern Burma's Karen State, and displaced 500,000 people in the past 12 years, according to the activist organization U.S. Campaign for Burma.[16] The government has placed tight restrictions on Internet and phone lines in an attempt to limit communications among the citizenry and prevent pictures and reports of the violence from spreading around the globe. In the face of this communications crackdown, activists have used other mechanisms—sophisticated and yet simple—to show these atrocities to the world.[17]

High-resolution satellite images taken of more than 26 sites in the targeted Karen State region and analyzed by scientists reveal the burning of villages and the appearance of new relocation villages for displaced persons. Such images corroborate accounts that the military junta has attacked and burned villages and forced relocation of hundreds of thousands of people as part of an ethnic cleansing campaign that the government has repeatedly denied has taken place and the media has largely failed to report.[18]

The use of off-the-ground imagery to document civil conflict and human rights abuses is not new. The United States has used aerial photos for political purposes to depict conditions on the ground, as they did during the 1962 Cuban Missile Crisis. The United States provided aerial images of the Bosnian countryside to the U.N. Security Council in 1995 when it convened to discuss the crisis in the Balkans. The images, taken by a Pentagon U-2 spy plane, revealed mass graves and unburied bodies near the Bosnian town of Srebrenica where 7,000 Muslim men had gone missing.[19] A few years later, NATO aerial images indicated the location of freshly-dug mass graves in Kosovo after Serbian ethnic cleansing there.[20]

Technology has advanced since the 1990s, of course, and groups are now able to document human rights abuses in much more sophisticated ways. Hundreds of commercial or government-owned satellites now orbit the Earth, many of them featuring sufficiently high-resolution optics to provide evidence of human rights abuses. Of these, six high-resolution commercial satellites can provide images to human rights NGOs: WorldView-1 and QuickBird, operated by the U.S.-based DigitalGlobe; IKONOS and GeoEye-1, operated by GeoEye, also U.S.-based; Eros-B, operated by the international ImageSat; and Kompsat,

developed by the Korea Aerospace Research Institute. These satellites, to say nothing of the satellites operated by the United States and other governments, are in constant orbit around the Earth, acquiring and archiving images of cities and villages from space.

The high-resolution images that these satellites produce can provide evidence of the destruction or relocation of villages or the existence of mass graves and secret prison camps. The American Association for the Advancement of Science, Amnesty International, Human Rights Watch, the U.S. Holocaust Memorial Museum, Google Earth, the United Nations Institute for Training and Research's Operational Satellite Applications Programme, the U.S. State Department, and other NGOs and government agencies have worked, often in collaboration, to acquire, analyze, and promulgate these images to provide evidence of human rights atrocities.

Satellite imagery can be used as a tool to discover evidence of both recent crimes and ones long past, such as the mass graves of Serbs, Jews, and Roma killed in Croatian detention camps during World War II. In 2005, at the site of the "Cancari Road 10" mass grave near Zvornik in Bosnia and Herzegovina, the International Commission on Missing Persons used satellite imagery to help researchers discover hidden mass graves.[21] More recently, satellite images have revealed the locations of mass graves in Iraq and Afghanistan.[22]

Advances in satellite imagery technology also allow the United Nations, the U.S. government, and NGOs to use images taken from space to document ongoing atrocities. Satellites can gather images of landscapes or villages in near real time—sometimes up to a 50-centimeter spatial resolution. These images, when compared to older, archived satellite images of the same geographical location, demonstrate changes in village infrastructure that corroborate reports of intentional destruction and displacement. Such imaging can be especially helpful when on-the-ground or plane-view documentation of crimes would be cumbersome or impractical to acquire. For example, in remote areas in Africa, such as Ogaden, Ethiopia, with rough, nearly impassible terrain; in places such as Darfur, from which advocates have been barred; in regions where local communities lack the technology to allow for Internet access; and in places like Burma where those who would possess on-the-ground tracking or documenting devices become targets of the military junta. As one journalist put it, "While it would be dangerous for a non-governmental organization to fly a spy plane over warring territories to look for mass graves, very high-resolution commercial satellite imagery could, without risk, provide data to much the same effect."[23]

One prominent example of the use of satellite images to document human rights abuses occurred in 2006 when the American Association for the Advancement of Science, or AAAS, gathered and analyzed satellite images of the Porta Farm settlement in Zimbabwe. The images, taken before and after reports of a campaign against government opponents, provided evidence of total destruction. The "before" pictures depict the settlement and its 850 homes intact. The "after" images show that the entire settlement has been leveled in an

BEFORE

AFTER

Images of the village of Dameerey, Ethiopia. About 65 structures, almost the entire town, were removed (possibly burned), since the collection of the top image. Images produced by the American Academy for the Advancement of Science. © Copyright DigitalGlobe 2009. All rights reserved.

apparent act of political punishment by an oppressive regime—an act that forced thousands of residents to relocate.[24] The images provided "shocking evidence" of the community's total obliteration[25] and were submitted by the Zimbabwe Lawyers for Human Rights to the African Court on Human and Peoples' Rights as part of their ongoing case against President Robert Mugabe.[26]

Since then, satellite imagery has been used by a variety of government and NGO initiatives to monitor village destruction and other crimes and humanitarian crises in Burma, Chad, the Congo, Eritrea, Ethiopia, Gaza, Georgia, Lebanon, Nepal, North Korea, Somalia, Sri Lanka, and Sudan. Human Rights Watch, or HRW, reported in early 2008 that the Ethiopian military had attacked thousands of ethnic-Somali Muslim civilians who had been living in the country's eastern Ogaden region, despite denials by Ethiopian authorities that human rights abuses had taken place. Ogaden is one of the most isolated places on Earth with a limited number of passable dirt roads. To make matters worse, HRW had been banned from the region and was unable to confirm or provide evidence of these attacks. Sidestepping these challenges, the AAAS gathered satellite images of eight locations. The images provided visual evidence of razing, burning, and the disappearance of building structures that corroborated the HRW reports of these attacks.[27] High-resolution satellite imagery publicly available through Google Earth reveals labor camps in North Korea that currently detain an estimated 200,000 political prisoners. The images, which show entrances to prison mines surrounded by guard towers and electrified fences, corroborate reports from survivors who were forced to work as slaves and told stories of prisoners who were tortured, starved, or worked to death.[28]

Perhaps most notable are the ways in which satellite imagery is being used to document the ongoing genocide in Darfur, Sudan. Researchers at Yale University's Genocide Studies Program tracked a steady return of natural vegetation from 2003 to 2007 in the areas of Darfur most affected by the systematic violence that the *Janjaweed* militia had inflicted during that time. This dramatic return of vegetation is seen as evidence of the massive removal of the farming population and the theft and destruction of their grazing livestock.[29] In another initiative, the U.S. State Department has released a list, based in large part on satellite imagery, of 3,300 villages in Darfur that have been damaged or completely destroyed since 2003—a number that exceeded previous estimates.[30] That imagery data is now available on Google Earth for public view.

Activists at Amnesty International also identified 12 high-risk villages in Darfur where *Janjaweed* militia had repeatedly overrun villages, raping and killing at random. As part of its "Eyes on Darfur" project, Amnesty collaborated with scientists at AAAS who retrieve and analyze images of these villages on a regular basis and then post these images online. Amnesty invited people around the globe to keep an eye on the targeted areas and then informed the Sudanese government that the world was watching the ongoing genocide. Today all but one of those villages—the village of Saraf Jidad—remain intact. This is perhaps the first time people have ever been protected by global citizen policing via satellite. According to Amnesty, the images and resulting campaign also produced political pressure on Chad and were a key factor in the Chadian government's decision to allow peacekeeping forces at the border between Chad and Sudan. The International Criminal Court has found satellite evidence to be of use as well, having utilized the AAAS's analyzed satellite images of Darfur in early proceedings that led to the arrest warrant for Sudanese President Omar al-Bashir.

Satellite imagery applications illustrate the ways that technology can be—and has been—a useful aid to document human rights abuses, but the more pressing goal is to prevent atrocities before they occur. A key component of that task is to identify countries and regions at risk before they erupt into widespread violence.[31] Scientific knowledge and innovative technological tools, including data and information gathered from satellite imagery, can play an essential role in assessing risks and generating early warnings of potential crimes against humanity. Integrating the natural sciences, including biology, chemistry, physics, and climatology, with social science studies, such as geography, demography, and anthropology, and new computing models can allow scientists, human rights workers, and policymakers to work together to more effectively predict, monitor, assess, and intervene in situations where thousands of innocent victims may be in jeopardy.

Many of the bloodiest examples of ethnic-based crimes against humanity can be linked to a variety of seemingly unrelated situations and factors that range from population density and limited access to basic life-sustaining resources to a pursuit of ill-gotten economic gain. Deadly conflict can erupt in poorer areas from competition over basic resources, such as access to water. The realities of the 21st century, including climate change and a diminishing global oil supply, have exacerbated existing demands on resources and will continue to have increasingly deadly impacts on populations. Scientists at the U.N. Intergovernmental Panel on Climate Change have suggested four climate-induced conflict constellations that may foster severe violence around the world: degradation of freshwaters, decline in food production, increase in storm and flood disasters, and environmentally induced migration. And they have been able to highlight regional "hotspots" that the world would be well advised to watch closely by linking demographic studies to scientifically rigorous assessments of geography and climate change realities .[32]

New scientific evidence, for example, indicates that the current drought that began in West Africa in the 1960s is not an anomaly when compared to weather patterns in Africa over the

"We are trying to send a message to the military junta that we are watching from the sky."

– Aung Din,
 U.S. Campaign for Burma

last 3,000 years. This new research reveals that the drought could last for centuries and would likely be exacerbated by climate change. The study concluded that "droughts will continue to occur, and that decades-long droughts should be a very real concern" because it "would be very difficult for people to adjust to the change," especially if a drought lasted for a century.[33]

When considered within the context of these broader trends, the techniques used by the AAAS satellite imagery program could have predictive applications. There are expansive satellite imagery archives with comprehensive records that date back to the 1980s. The images captured over Rwanda prior to the outbreak of violence there in 1994, for example, could be studied—analyzed at monthly or even weekly intervals—to reveal population or climate trends in order to develop a chronological taxonomy of the relationship between those trends and genocide.

Scientists can similarly use advanced sensing technologies in tandem with predictive studies to identify regions at risk before they explode into conflict. The remote sensing techniques that were used by Yale to track vegetative changes resulting from the genocide in Darfur, for example, can also be used to track, understand, and quantify the factors that contribute to environmental strains that cause violence. Scientists have suggested that remote sensing should be used more consistently to track the potential competition for diminishing resources, thereby equipping human rights advocates with data to predict and respond proactively to potential violence.[34]

Obstacles

These examples highlight the ways that human rights NGOs have worked to shed detailed light on the grave realities of human rights abuses, often in collaboration with the U.S. State Department, the United Nations Institute for Training and Research's Operational Satellite Applications Programme, and international legal institutions. But human rights groups and other NGOs, who are often better-suited than government agencies to publicize this satellite imagery data and make it available to international legal institutions, encounter a variety of obstacles that significantly inhibit the potential these tools have to monitor and document human rights abuses.

The process of gathering and analyzing the appropriate images is an arduous, multi-step task fraught with technical, cultural, and political challenges. Technicians need to know where to focus their attention—something that is gleaned primarily from the eyewitness reports of displaced victims in refugee settlements. Once a village has been reported as having been destroyed or as being subject to possible destruction, its precise location must be acquired, accurate to within 1,500 meters. But many regions of the developing world are not sufficiently mapped or catalogued to allow for this level of accuracy. The version of the U.S. Department of Defense's global names database—the U.S. National Geospatial-Intelligence Agency databases or GeoNet Names—that is available for public

view is fraught with holes and inaccuracies. The United Nations, which often initiates large-scale mapping efforts in regions with a U.N. presence, has comprehensive map databases only in select places.

To complicate things further, village names, spellings, and regional categorizations are susceptible to political and cultural influences, making even existing collections a challenge to use. Because there is no comprehensive, consistent, publicly available database, researchers must undertake a laborious process to determine the village's coordinates, overlaying a variety of imperfect sources, including digitized versions of old Soviet military maps, U.S. Army Air Corps maps, French colonial maps of Eastern Congo, and others, to locate a specific village.

If researchers *can* determine a village's likely location, they must then work with the various satellite archives to acquire images of the location before the reported attack and must request current images of the location. This is often a costly and time-consuming affair. NGOs must compete with conflicting requests for use of the satellites by governments and private corporations.[35] And each new image costs around $2,000—a very onerous sum for most human rights groups.

Recommendations

Update and upgrade the public version of the U.S. Department of Defense GeoNet Names Server database. Human rights organizations require a comprehensive, standardized naming and border database in order to gather satellite imagery of locations of suspected human rights abuses. The United Nations is only able to maintain up-to-date databases in areas where it is currently operating. The U.S. government is not under the same restrictions and is therefore well-situated to develop a comprehensive mapping of towns, villages, regions, and borders. The U.S. Department of Defense, or DOD, already has an existing system for mapping these markers, but the publicly available DOD database, VNAP-0, is incomplete with large regions uncharted and many regions out-of-date and inaccurate. The U.S. government should invest in efforts to update and upgrade the publicly-available VNAP-0 database.

Such an initiative will require significant time and resources and may require country-specific strategies—especially in the case of states with authoritarian regimes that may try to thwart the collection of this data. It may also raise political questions that will need to be addressed and resolved, including international accusations related to U.S. espionage or domestic political pressures to focus resources elsewhere. In light of these issues, if the DOD does not create and release a comprehensive, publicly-accessible database, it should at a minimum release specific portions of its more comprehensive VNAP-1 database for public use in areas of particular concern, including Darfur, Burma, and the Congo. VNAP-1 is currently classified for all regions outside of the United States.

Increase access to commercial satellite imagery for human rights organizations.
There are six commercial high-resolution satellites in orbit that are accessible to human rights activists and advanced enough to identify evidence of human rights abuses.[36] The QuickBird satellite, for example, provides most of the images displayed on Google Earth. But since these satellites service both government and private-sector requests, they are in high demand. And only the U.S. government, which has in some cases worked in partnership with human rights groups to acquire and analyze imagery, can make a direct request for images from the WorldView-1 satellite—the most agile of the commercial satellites.

The high cost and high demand for satellite images inhibit the ability of human rights advocates to utilize these technologies to document human rights abuses. This is true despite the fact that it is those very advocates who are often better suited than the U.S. government to make these images publicly available without fear of international political repercussions. There are a variety of things that the U.S. government can do, in collaboration with the satellite companies, to make satellite imagery more accessible to human rights organizations that monitor areas of ongoing conflict.[37]

First, the U.S. government can notify human rights NGOs when images in high-risk areas are available. It costs approximately $2,000 to order a new satellite image, but only a few hundred dollars to access an image that has already been acquired. The U.S. government could make a list of recent image purchases available to human rights groups, which could then make strategic, well-informed decisions about which images they should buy.

The U.S. government enjoys specific negotiating privileges from the satellite companies that allow it to view images in full detail before determining whether to purchase the image. Non-U.S. government parties, including human rights organizations, must purchase an image before viewing it and knowing whether it would be useful to them. The satellite companies should extend these special prior-viewing privileges to human rights organizations.

Develop an ongoing, comprehensive effort to facilitate community monitoring. The U.S. government should commit to making satellite imagery of high-risk locations publicly available on a weekly basis. It could identify several high-risk regions—either in the midst of conflict or at risk for potential conflict—and commit the resources to gathering imagery of these locations on a weekly basis and making them publicly available. Google Earth would be an appropriate avenue to house these images, as this would capitalize on existing collaborative efforts between Google Earth and the U.S. State Department. Once this program was set in place, the federal government could fund an initiative to develop methods for automated change detection in order to rapidly identify different patterns of human rights abuses.

Develop partnerships across U.S. agencies to make U.S. government satellite imagery available to the State Department's Bureau of Intelligence and Research war crimes investigation staff. The National Oceanic and Atmospheric Administration, National Aeronautics and Space Administration, and Department of Defense each operate high-

resolution satellites currently in orbit. There are, however, no government-owned satellites that are known to be currently available for the purposes of tracking, uncovering, or monitoring rights abuses. The Bureau of Intelligence and Research should develop formal partnerships with NOAA, NASA, and DOD in order to utilize satellite imagery for human rights purposes.

Databases and data analysis techniques

The victims of human rights abuses are always individuals with names, stories, and faces. But in order to hold perpetrators accountable for such mass crimes, it is often necessary to discern meaningful patterns in the thousands of individual accounts and transform those accounts into quantifiable evidence sufficient to stand up in a court of law. This requires complex data analysis software systems.

Such data analysis applications are currently being used to document the atrocities of Guatemala's recent past. Guatemala was ripped apart by a bloody civil war that lasted from 1960 to 1996. An estimated 200,000 people were killed or went missing during that time at the hands of the much-feared Guatemalan National Police. The only evidence of the kidnappings, illegal detentions, tortures, and murders came in the form of personal narratives and press accounts. But almost 10 years later officials discovered a deserted warehouse that housed the National Police's historical archives—documents that assiduously recounted the reign of terror. Eighty million pages of evidence against the National Police were stashed amidst rats, bats, bugs, and mold.

Without high-tech excavating and sorting capabilities, this massive amount of information, valuable as it was, could never have been organized into a comprehensive, statistically accurate narrative that human rights NGOs and international tribunals could use to bring the perpetrators to justice. Too often, as one software manufacturer has observed, "information is lost due to confiscation or destruction, neglect, passage of time, or because the grassroots organizations that collect the data lack the resources or infrastructure to document and communicate violations systematically and securely."[38]

This would have been the fate of the Guatemalan records had authorities not looked to Benetech—a human rights NGO that produces data analysis software—to excavate, randomly sample, and code the records.

Benetech has developed an open-source data storage mechanism called Martus that allows individuals around the world to securely upload valuable, legally and politically sensitive information, which is sorted and analyzed by technicians at the organization. This secure sorting system protects information from being lost or falling into the wrong hands. In the case of Guatemala, organizing and analyzing the information also makes it into a key resource that documents violence against urban populations—one that is appropriate for admissibility in a court of law.

Benetech's Human Rights Data Analysis Group has also played an essential role in demonstrating that Liberian President Charles Taylor—already on trial for crimes committed in Sierra Leone—was responsible for widespread violations in Liberia. Benetech analyzed over 17,000 victim and witness statements collected by the Liberian Truth and Reconciliation Commission, or TRC. The analysis produced a comprehensive, scientifically sound narrative that revealed compelling evidence that the Liberian rebel group in Taylor's command committed widespread crimes in Liberia, and this evidence was cited in full in the TRC's report released this July.[39]

Benetech is but one of many organizations that use today's advanced data analysis techniques to prove that many cases of mass violence are the result of planned, systematically executed policy.[40] Such evidence has been introduced at a number of international criminal proceedings, including the International Criminal Tribunal for the Former Yugoslavia, and has great, largely yet untapped potential to be a critical resource in the struggle to bring perpetrators to justice and prevent the recurrence of atrocities.[41]

Obstacles

Indigenous human rights groups often lack knowledge of these tools or find them inaccessible for financial or technical reasons. More funding is required to provide resources and training to local human rights activists, as well as to the United Nations and international NGOs so that they can use these software tools more broadly and effectively.

Another challenge is that many governments around the world have regulations that restrict or prohibit cryptography software—the data-scrambling these systems use to protect the integrity of the data and the identities of victims and witnesses. The U.S. government also prohibits U.S. companies from exporting cryptography technology to anyone in countries that are on the U.S. terrorist list—including activists and human rights organizations in those countries. These regulations compromise local human rights groups' ability to hide politically sensitive information from the perpetrators of human rights violations—including the names and testimonies of victims and witnesses.

Recommendation

Support international prohibition of restrictions on cryptography. Programs such as Benetach's Martus, the Human Rights Information and Documentation Systems International, and other data collecting and analysis systems have great potential to aid human rights advocates. These technologies would allow local communities, victims, and human rights advocates to store their own testimonies and locally gathered documentation, contribute and aggregate those stories with others to reveal trends of abuse, and make those individual reports and aggregated trends available around the world. Yet such valuable and

"When I visited the National Police archives I had a very strong feeling, a longing for justice. My head was filled with images of the past we should never forget. We want justice."

– Alvaro Colom Caballeros, President of Guatemala (2008–2012)

extremely sensitive information must be carefully protected from human rights perpetrators who could use it to crack down on local victims or activists. The solution is for this material to be carefully encrypted. But not surprisingly, authoritarian regimes around the world prohibit cryptography.[42] The U.S. government should support removal of unreasonable restrictions on cryptographic resources.

Medical forensics

The ancient body of the "Loulan Beauty" and other well-preserved mummies excavated from the Xinjiang Uighur Autonomous Region of China have shed new light on the dispute over the control of Xinjiang province—a fight that took a deadly turn this summer when nearly 200 people were killed in riots in the Xinjiang capital of Urumqi. The Chinese claim that the oil-rich region has long been a part of the Chinese empire, but the Loulan Beauty's traits suggest that she and her people—the region's first settlers, who arrived thousands of years ago—are more closely related to the Turkic-speaking Muslims who currently dwell in Xinjiang.[43] The evidence revealed by this anthropological discovery has real political and human rights consequences today as some Uighurs advocate separation from China and the Chinese government cracks down on such efforts, committing serious human rights abuses in the process.[44]

Human remains have long been useful resources for determining historic truth since they often reveal information about the lives, customs, and deaths of those who came before us, those whose stories were left untold. Now recent innovations in forensic technology, often combined with satellite imaging that locates mass graves, allow scientists to uncover the tragic tales of people who have died more recently, often as a result of genocide or mass killings.

Physicians and other forensic specialists toiled for months in the region surrounding Srebrenica in Bosnia in 1996 exhuming hundreds of decomposing bodies from several sprawling mass graves in Kraviza, Pilica Farm, Cerzca, and Lazete that contained the remains of hundreds of Muslims slain the previous year by Bosnian Serbs.[45] The international community located the graves, each peppered with shell casings and holding layered bodies of hand-tied civilians bearing bullet wounds to the skull, when American spy satellite images corroborated reports from survivors. The team of U.N. war crimes investigators used their skills in pathology, radiology, anthropology, and archaeology to exhume the graves, collecting evidence that documented the war crimes that had been committed there in 1995.[46] The facts gleaned from these excavations constituted the first scientific evidence against General Radislav Krstic and played a key role in his conviction for genocide at the International Criminal Tribunal for the Former Yugoslavia.[47]

More recently, the Peruvian Forensic Anthropology Team, or EPAF, funded by the U.S. Department of State's Bureau of Democracy, Human Rights, and Labor, has used state-

of-the-art computer software to determine with increased accuracy via bone evidence the characteristics of bodies excavated from mass graves in Peru. This, coupled with cutting-edge DNA testing, has allowed EPAF to document the disappearance of many of the thousands of targeted victims murdered by the Peruvian military during the nation's 20 years of armed conflict from 1980 to 2000.[48]

In still another part of the world, the International Forensics Centre of Excellence for the Investigation of Genocide has trained dozens of Iraqis in the science of exhuming mass graves. The Centre and its trainees have excavated the graves of the 100,000 Kurds killed in the 1980s and 1990s by Saddam Hussein and his henchmen. Sponsored by the U.S. Department of Justice, the centre has linked bones, clothing, identification cards, jewelry, and photographs with DNA information that may provide closure to the families of victims and evidence for building strong legal cases against the perpetrators.[49]

Similar forensic techniques are also used to give names to the silenced victims. Physicians at the Laboratory for Clinical and Forensic Genetics in Split, Croatia, working with U.S. government forensic specialists,[50] toiled for years in the 1990s exhuming decomposed bodies from 16 mass graves in Bosnia and Herzegovina that contained more than 150,000 people murdered in the 1991-1992 conflict. The team members, made up of physicians and observers from international NGOs, used traditional physical or bone feature analysis and innovative DNA comparisons to uncover the identities of these victims.

Some of the skills used in forensic investigations are identical to those routinely used by medical examiners, coroners, and odontologists—experts who specialize in comparing dentition and dental records. The identification of pelvic bones and skull dimensions can determine sex. Bone length and thickness can allow a close estimate of the age at death. Teeth are especially useful for identifying individuals. Each of these techniques, on their own, produced positive identification in only 20-25 percent of cases. But scientists were able to use cutting-edge DNA isolation procedures and vigorous DNA purification techniques to increase the efficiency of identification by genomic DNA to up to 85 percent.[51]

Forensics are not just useful for identifying the dead. DNA fact-finding can have important applications for living victims of human rights abuses, such as Latin American parents and their children who were ripped apart from one another when the children were small.

Hundreds of children disappeared during El Salvador's violent civil war in the 1980s, and their families finally have new hope of finding their long-lost children, thanks to the help of Pro-Búsqueda, an innovative DNA forensics organization. During the conflict, the military forcibly took many of these children as their parents watched; others were lost when family members were killed or disappeared. An estimated 2,300 Salvadoran children were adopted in the United States and Europe during these years. Many of these children have grown up in their adoptive homes not knowing what happened to their families in El Salvador. Some of them know their birth names, others remember faces, but many have no memories of their birth families at all.

> "Until the facts are known and bodies returned, relatives of the missing will be unable to come to terms with their loss. We must investigate the crimes of the past to build peace in the future."
>
> – José Pablo Baraybar, Director of the Peruvian Forensic Anthropology Team

Many of the missing children are now in their 20s and are beginning to come forward to search for their families. The number of known cases of reunion—787 in 2006—increases annually with approximately 25 new cases of missing children in El Salvador presented to Pro-Búsqueda each year. The organization has confirmed the identities of over 300 children and continues to locate approximately 10 children each year.

The International Forensic Program, or IFP, at Physicians for Human Rights has supported Pro-Búsqueda's work since 1994 by arranging for DNA testing by a network of U.S.-based DNA experts to confirm identifications of El Salvador's missing children. The IFP has also assisted Pro-Búsqueda in locating adoptive parents in the United States, making preliminary calls to contact family members, and providing guidance on legal and psycho-social support—all thanks to the application of new technologies to the service of victims of human rights crimes.

Obstacles

There is perhaps no clearer evidence of crimes against humanity than the existence of bodies of people who have been systematically murdered and hidden in mass graves. Yet advanced forensic techniques take advanced scientific expertise, are time consuming, and still do not yield results 100 percent of the time. What's more, authoritarian—and occasionally even democratic—regimes are likely to do anything in their power to prevent this indisputable evidence from being gathered.

Recommendation

Increase commitments from the Department of Defense and U.S. military personnel to collaborate with the United Nations and NGOs in investigating mass graves. U.S. government agencies, including the Department of Justice,[52] the Forensic Science Laboratory at the FBI Academy,[53] the U.S. Department of State's Bureau of Democracy, Human Rights, and Labor,[54] and others, provide important research, excavation, and funding support to state, United Nations, and NGO efforts to excavate mass graves for the purposes of documenting human rights abuses and identifying victims. U.S. military services have also played key roles in protecting excavation sites.[55] Yet U.S. government agencies have not always been supportive of the scientific examination of human rights abuses. Recent allegations indicate, for example, that key defense personnel delayed and even obstructed exhumations of a mass grave at Dasht-e-Leili in northern Afghanistan.[56] The grave, which had already been exhumed in part by Physicians for Human Rights, is a source of evidence regarding the deaths of Taliban prisoners held by U.S. government-backed Afghan forces.[57] U.S. military personnel should commit to maintaining the integrity of crime sites, providing support to trained personnel as they preserve and excavate mass graves and cooperate with legitimate efforts to uncover evidence of war crimes.[58]

"If collected properly, forensic evidence speaks for itself. And the realization that forensics can expose the perpetrators may be sufficient to stop a genocide before it happens."

– Margaret Cox, head of the International Forensics Centre of Excellence for the Investigation of Genocide

Mobile phones and social networking software

Information and communication technologies have become key tools in the struggle for human rights. They are social, global, ubiquitous, and cheap.[59] Used to help mobilize protestors, connect remote communities to essential resources, empower local communities to prevent human rights abuses from happening in their towns,[60] or activate online campaigns, they are having a profound impact on both human rights violators and those who try to stop them. When photo images of the Chinese massacre of students protesting peacefully in Tiananmen Square in June of 1989 circulated via news wire around the globe, it sent a message to the Chinese government that "the whole world is watching," that it could not mistreat its citizens and expect no one else to know about it. If that was true in China in 1989 when technology was decidedly "low," it is all the more true today as Chinese officials implicitly acknowledged when they shut down Twitter and other new electronic spaces for free expression on the 20th anniversary of Tiananmen in June of this year.[61]

Coincidentally, events in Iran that same month were illustrating dramatically the power of high-tech communications. The world watched in real-time on the three largest international social networks—Facebook, MySpace, and Twitter[62]—as Iranians used Twitter and other electronic communication software to mobilize protests over the alleged re-election of President Mahmoud Ahmadinejad and document the violent military crackdown as those protests turned deadly.[63] Dissenters used blogs, Facebook profiles, cell phone books, and the now-famous #IranElections Twitter hash tag to both mobilize massive protests and insure that what was happening inside Iran would reach the eyes and ears of those outside the country.[64]

As violent attacks by the Basij paramilitary forces increased and government restrictions on mainstream journalists escalated,[65] everyone from the BBC office in Tehran[66] to U.S. Assistant Secretary of State for Public Affairs P.J. Crowley began to rely on "citizen journalists"[67] for information. The demonstrators deployed the camera, video, and text message functions in their cell phones to provide live footage of the drama playing out in the streets of Tehran, including the death of Neda Agha-Soltan, the young woman gunned down outside a rally who, in her last few minutes of life, became a global symbol of the struggle for democracy.[68]

Such political uses of technology are only possible because of the dramatic speed with which computing capacities and social networking applications have grown over the past 10 to 20 years. Today's laptops are more powerful than mainframes were a decade ago. Ordinary individuals with access to mobile phone and Internet service are now equipped to be producers of high-quality information, using Web 2.0 functions—the "second generation" of web design that facilitates information sharing and user-centered design, allowing private, non-professional users to be designers and producers—to create texts, blogs, software, audio, photograph, video, and other information products that can be globally distributed.[69] These tools fundamentally change on-the-ground situations in cases where basic rights, free expression, and fair elections are denied.

Blogger-activists have emerged in every corner of the globe, from Moldova to Cairo to Pakistan, China, and Cuba[70]—anywhere that tech-savvy citizen dissidents, threatened by authoritarian rule, see the need for a global microphone to announce their grievances and connect to each other and the rest of the world. Such applications demonstrate the capacity that information and communication technologies have to support free expression and human rights by providing new channels of communication, a broader base of participation, empowerment of victims, and new avenues for the rest of the world to support those whose rights are being denied.[71]

And tech-savvy dissidents living under authoritarian regimes are not the only ones who can use information and communication technologies to advance human rights and welfare. Even the most basic cell phones have simple applications that can have huge humanitarian applications in communities that lack sophisticated technological infrastructures.

Far away from the Tehran Twitter buzz, victims of sex trafficking are using their basic cell phones to protect themselves from brutality. Sex trafficking—and the rape that so often accompanies it—runs rampant in Southeast Asia. Ninety percent of sex workers interviewed in Cambodia reported having been raped in the previous six months, many by police. The Asian Pacific Network for Sex Workers sponsors a project that will enable even illiterate sex workers to instantly and anonymously report their abuses to a centralized server. The information they gather can be used to identify and prevent these violent trends. Now, even these workers in the closed-off subculture of sex trafficking who have a legitimate fear of authorities and few avenues to redress grievances can use their cell phones to document their abuses, campaign for their rights, and develop community momentum to raise social consciousness about the harsh realities of the sex industry.[72]

Similar efforts have been initiated around the world, utilizing text messaging capacities to gather reports of abuse, inform local communities of vital information, and mobilize grassroots movements. One simple and inexpensive software program called FrontlineSMS uses a single laptop, operated by a local human rights activist or humanitarian service provider, as a two-way group messaging hub that is connected to people or villages in a designated region or location.[73] It allows a remote village in the area—one that may share only a single cell phone in the entire community—to connect via text message to the central service provider, who can then respond to individual requests, gather and aggregate reports across the region, and provide essential information to all of the communities they service.

Health care workers at St. Gabriel's hospital in Namitete, Malawi, have recently adopted this social networking system to provide basic health care to their remote constituencies—250,000 people in 700 remote villages spanning hundreds of square miles.[74] Professionals at St. Gabriel's connect to distant patients who use recycled cell phones, which are available for as little as $10 per phone.[75] The free, downloadable program allows them to provide emergency medical care, transportation services, health information, and other clinical resources to an entire village via remote community health care workers, each armed with a cell phone.[76]

The cost of providing such tools is low compared to the benefits. The program saved St. Gabriel's health care providers hundreds of labor hours and $10,000 a year in fuel costs alone. The cost? Three thousand dollars, including the purchase of 100 recycled phones and airfare for a trainer to visit the community, and an operating cost of only $500 a year, including text messaging costs. Human rights groups in Nigeria, Zimbabwe, and Kenya have used FrontlineSMS and other software tools to build other networks of cell phone users, creating avenues for individuals and populations to more effectively report violations of voting rights to organizations that monitor elections and report on voter fraud.

Cell phones are perhaps the simplest and most useful tools in the human rights arena in those parts of sub-Saharan Africa, Latin America, and the Middle East, that find themselves on the wrong side of the world's digital divide.[77] A lack of technological infrastructure combined with high illiteracy rates, language barriers, and abject poverty make access to cell phones and the Internet a luxury in many parts of the developing world. Yet the number of cell phone users in Africa, for instance, has increased exponentially and simple applications of cell phone technology, including remote calling, text messaging, and photography capabilities, can connect individuals and communities to humanitarian aid workers, human rights defenders, lawyers, journalists, and many others.

Initiatives such as FrontlineSMS provide user-friendly, low-tech software tools that build social networks between cell phones in a given area. A network operator such as a health care provider, trusted official, meteorologist, or U.N. peacekeeping envoy can use the FrontlineSMS program to send messages to every cell phone in the area.[78] Ushahidi, an organization whose software engine allows any person or organization to gather and map reports by mobile phone, email, and the web, has been used in Kenya and elsewhere to monitor and report on elections, unrest, and outbreaks of violence, and aggregate this material into meaningful statistics.[79]

Even a recycled, dated cell phone can be a significant boon to human rights and development. Every voter who believes that she or he has been inappropriately turned away from the polls can report that experience to the groups monitoring election violations. Farmers in remote rural communities can receive via text message forecasts of weather that will affect their crops. An elder in an isolated remote village can photograph and report a medical emergency and receive vital treatment instructions and a "visit" from a health care service provider hundreds of miles away.

FrontlineSMS has also been deployed to support free expression and the flow of information in Pakistan, illuminate tensions between protesters and political masters in Burma,[80] distribute press releases for human rights action and policy advocacy in Taiwan, gather citizen reports of violence and train human rights defenders in the Congo, communicate security alerts and emergency information in Afghanistan, and for hundreds of other applications in all six populated continents.[81]

"Networked activism…provide[s] a framework that can be used to broadly mobilize individuals on human rights issues and encourage them to participate fully in the work."

– Molly Beutz Land, law professor and human rights expert, New York Law School

Information and communications technology, including projects such as FrontlineSMS and Ushahidi, has also contributed to a strengthening of Africa's economy and helped individuals and communities in developing countries move toward long-term economic sustainability by increasing their ability to communicate with others and access vital information. Text messaging allows rural farmers to assess market prices and make strategic decisions about where to sell their goods. Mobile banking has greatly reduced the prices that Africans pay to make monetary investments and exchanges throughout the world.[82] Major European phone companies, including Vodafone, Vivendi, and Orange, have invested in the growing promise of these technologies in Africa, where only 28 percent of the population currently owns a cell phone.[83] M-Pesa, a project associated with Vodafone, was recently awarded the U.N. Habitat Business Award for the effect it was having on "innovative IT solutions for sustainable urbanization"[84] and is expanding its efforts in East Africa and Afghanistan.

Obstacles

Activists are not the only ones who can use technology to serve their purposes. This technology can be used to promote rights just as readily as it can be used to inhibit them. Just three weeks after the disputed election, the Iranian government began to employ advanced software to censor and track down the people behind the online opposition movement. Authoritarian regimes such as China, Cuba, and Burma, fearful that the Iranian protests might spur upheavals in their own countries, censored news of the Iranian crowds who braved government militias to demand democratic reforms.[85]

China sentenced Liu Xiaobo, a drafter of the pro-human rights online petition Charter 08, to 15 years in prison for "alleged agitation activities aimed at subversion of the government and overthrowing of the socialist system."[86] It also issued an order, subsequently modified, that all personal computers sold in China must contain filtering software that critics say would deter political dissent.[87] These steps seem to confirm many human rights activists' concern that dictators and authoritarian regimes will dedicate more attention to inhibiting citizen use of these technologies, especially as these tools become increasingly recognized as useful or even essential tools in the human rights arena.

It is just as likely, however, that citizens under authoritarian rule who have the resources and ability to access information and communication technologies will continue to come up with inventive ways to sidestep authoritarian strongholds to express themselves, connect with fellow dissidents, and share their stories with the global community—especially if they have access to the latest tactics and technologies that allow them to communicate securely.

For some parts of the world, the problem is not government obstructionism, but lack of basic access. According to 2006 research from the World Bank, "cell phone usage in Africa is growing almost twice as fast as any other region; jumped from 63 million users [in

2004] to 152 million [in 2006]"[88] and is now at 28 percent of the population, compared to 60 percent globally.[89] Cell phone coverage and the number of individuals carrying mobile phones is growing, but most Africans still do not have access to the services needed to make or receive a telephone call, and there is a less-than-30 percent probability of coverage in the vast majority of sub-Saharan Africa.[90]

Africa faces even greater challenges when it comes to Internet accessibility and infrastructure. Less than 7 percent of Africans have access to the Internet, which is cumbersome to use and expensive where it exists at all. Several factors contribute to the unreliable, costly quality of the Internet in Africa.[91] First, the Internet is largely dependent upon fiber-optic lines, which in Africa are sparse compared to those along in North and South America, Europe, and Asia.[92] Second, the continent lacks sufficient Internet exchange points, which allow several competing Internet service providers to exchange Internet traffic among their networks, thus reducing the cost of Internet operations. Third, a lack of domain name system server locations, which allow everyday users to access websites on the basis of their name without knowing the Internet Protocol address,[93] leaves virtually all of Africa, Asia, and South America uncovered.

Until these basic issues related to cell phone and Internet access are addressed and alleviated by the global community, people in developing countries and remote areas will not be able to utilize these innovative technologies to report human rights abuses and invest in sustainable development solutions.

Recommendations

Build on the 21st Century Statecraft initiative by adding tools and functions aimed specifically at advancing human rights. The State Department's 21st Century Statecraft initiative is an innovative approach to diplomacy designed to engage with the public in the United States and around the world through Facebook, Twitter, YouTube, Flickr, and other social networking tools. The initiative also runs DipNote, the official U.S. Department of State blog;[94] sponsors Exchanges Connect, an international social networking site;[95] updates an interactive Google Travel Map, "Travels with the Secretary," which allows users to track Secretary Clinton's official state trips;[96] and offers a "Text the Secretary" function, allowing users to pose questions to Secretary Clinton.[97]

Secretary Clinton has called on all citizens to "be citizen ambassadors, using your personal experiences and networks to help end hunger and defeat disease, to combat climate change and to give every child the chance to live up to his or her God-given potential, and also [to be] special envoys for your ideals and for American values."[98] The 21st Century Statecraft initiative can be expanded to include human rights-supportive functions such as an ongoing human rights blog to supplement the State Department's annual human rights reports with updates on a regular basis;[99] a Google map allowing users to visualize and

track human rights abuses around the world; tools that would allow people around the world to report human rights violations; and text message options to facilitate donations to support victims of human rights crimes.

Use social networking software and data storage systems to improve cross-agency communication, collaboration, and information-sharing. U.S. government efforts to quell human rights abuses would benefit greatly from a coordinated communication system across agencies that would allow government employees to share human rights experiences, setbacks in the field, and area-specific information. As one Department of Defense report notes, social networking tools can be used to unlock the government's cognitive surplus: "Wisdom is scattered in tiny pieces within agencies and across the USG; social software platforms should be used to allow interested parties to search and discover important information."[100] This would be especially useful in facilitating the cross-agency use of high-resolution satellites to monitor and document human rights abuses.

Initiate a comprehensive government-industry partnership to bridge the international digital divide. President Bill Clinton called on high-tech CEOs; civil rights, education, and non-profit leaders; and his own cabinet members to join together and alleviate the digital divide between those Americans who have access to Information Age tools and those who do not. Recognizing that "access to computers and the Internet and the ability to effectively use this technology are becoming increasingly important for full participation in America's economic, political, and social life,"[101] President Clinton specifically called on the information technology industry to take moral responsibility to make these tools available to those in need, saying, "Closing the digital divide is one of the most important things we can do to eliminate the kind of poverty that is inexcusable in an economy like the one we have today."[102] President Obama should extend this challenge to the international level, calling on information technology companies to play an active role in America's millennium development goal commitment to develop global partnerships for development.

One key way that corporations and the federal government can work together is by creating partnerships to send recycled phones, laptops, and software to communities in developing countries. For Malawi's St. Gabriel's hospital, $3,000 purchased a laptop hub, 100 recycled phones, and hands-on technology training. Within six months, two doctors servicing 250,000 people saved a thousand hours of time and thousands of dollars in fuel that would have been expended for unnecessary travel, making more funds available to purchase drugs and essential health care equipment.

The International GSM Association should implement incentive schemes to encourage local mobile phone operators in developing countries to provide text messaging services to social change projects for little or no cost. While the rampant spread of mobile technology into rural areas of developing countries presents the NGO community with infinite new possibilities, they also bring a whole new set of challenges. One significant barrier is the ongoing cost of sending a text message. Each text message sent in a develop-

"Mobile phone technology has the capacity to leapfrog more traditional forms of communication and bring much of Africa into the 21st century. Access to banking, market information, communication and even conflict resolution, has now become possible through the mobile phone."

– Anne O'Mahoney, Kenya Country Director, Concern Worldwide

ing area costs anywhere between one and ten cents. This is a significant price for many and places an onerous burden on local non-profit organizations that send messages with vital information to dozens or hundreds of phones in a network. A lack of funds to cover these ongoing operational costs is the biggest single challenge to humanitarians and local professionals who have already set up useful ways to provide life-sustaining services to those in their area. Per the recommendations of FrontlineSMS users and other ICT humanitarian organizations, the GSM Association, which represents mobile operators around the world, should develop and implement text message-based incentive schemes as part of their corporate social responsibility platform. This would encourage operators in developing countries to provide more support to social change projects for lower prices or at no cost.

Conclusion

The use of new technologies to advance human rights is a development still in its infancy. As new discoveries are made, new human rights applications will be possible. One area that holds promise, for example, complicated though it is, is that of predictive modeling. Using computer-based models of artificial societies, scientists may be able to identify conditions that foster civil unrest or even genocide. As Joshua Epstein has observed, these "methods offer a novel and … promising approach to understanding the complex dynamics of decentralized rebellion and interethnic civil violence and, in turn, to fashioning more effective and efficient policies to anticipate and deal with them."[103]

We can expect that scientific knowledge and technology will continue to increase in exponential ways and develop in unexpected directions—from satellite imagery, data analysis software, forensics, social software, and the many other cutting-edge technologies that now play a daily role in the fight for human rights to artificial society predictive modeling programs and other new inventions with yet-undiscovered applications for human rights. As research and innovation makes the world more informed and more connected, it will continue to increase our ability to keep a watchful eye on those who perpetrate abuses of human rights in all corners of the world.

Whatever new technologies or applications surface, the fundamental premise should always be, "Are there ways that this new development can help address the age-old phenomenon of human rights violations?" The U.S. government has a key role to play in facilitating a positive answer to that question by investing in innovation and research and facilitating essential partnerships between government, business, science and human rights advocacy designed to make the world a safer and more just place for all.

Endnotes

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