



## **Bases of Readiness: Installation Sustainability and the Future of Transformation**

by

**Stanley H. Lillie and Paul A. Martin**

Weeks after the 11 September 2001 terrorist attacks, soldiers and environmentalists stood outside a chain-link gate in Hawaii's Makua Valley and announced the resolution of a lawsuit that had cut off live-fire training for three years.

"The issues that once divided us no longer seem as important as the cause that now unites us," Major General James M. Dubik, commander of the 25<sup>th</sup> Infantry Division (Light), told reporters that morning.<sup>1</sup>

The settlement announced that day with the environmental legal firm Earth Justice and local group Malama Makua restricted the Army to 39 company-level, live-fire exercises over three years and, among its provisions, required the Army to complete an environmental impact statement.

Partnerships forged in crisis can be fragile. A public meeting in March 2002—barely six months later—drew more than 80 community members, who spoke on both sides of the issue. Malama Makua board member Sparky Rodriguez said there is "no limit" to issues that might be raised in subsequent meetings. He mentioned land use, sovereignty, unexploded ordnance and environmental contamination as possibilities.<sup>2</sup> Obviously the "issues" were still potentially very divisive.

This conflict in "paradise" represents, in miniature, the challenges the Army must face as it struggles to sustain its readiness capacity while fulfilling its 21<sup>st</sup> century environmental responsibilities.

"We have two obligations," said Colonel (Promotable) John C. Woods, assistant division commander (operations) for the 25<sup>th</sup> Infantry Division. "To ensure our soldiers are trained and ready, and to protect the environment entrusted to our care."<sup>3</sup>

*The Landpower Essay* series is published by AUSA's Institute of Land Warfare. The series is designed to provide an outlet for original essays on topics that will stimulate professional discussion and further public understanding of the landpower aspects of national security. The content represents the personal opinions of the author and not necessarily the position of the Association of the United States Army or its members. Candidate essays of 5,000 words or less may be submitted to: AUSA's Institute of Land Warfare, ATTN: Landpower Essay Series, 2425 Wilson Boulevard, Arlington, VA 22201. For more information about AUSA and the Institute of Land Warfare, visit our website at [www.ousa.org](http://www.ousa.org).

## **Concept of Sustainability—A Key to Transformation**

Who, where and how U.S. soldiers will fight is transforming, almost on a daily basis. Army Transformation represents a deliberate, strategic initiative to shed old concepts and patterns to prepare for a dangerous future while maintaining a capability to fight and win in the present.<sup>4</sup>

Underlying Army Transformation is the concept of sustainability—meeting the needs of the present without compromising the future. That long-term definition of sustainability<sup>5</sup> has gained wide currency over the past two decades in the world of resource management. But in military terms, sustainability has meant something else. Military sustainability focuses on operational “staying power,” maintaining a duration or level of intensity on the battlefield.<sup>6</sup> Today, Army commanders must also think of sustainability in terms of long-term investment strategies to create a sustainable readiness base. Specifically, the United States must develop ways to sustain soldiers and the Army’s capacity to give them the ability to succeed throughout the spectrum of possible operations.

Everything the Army does, from training to housing and materiel acquisition, is done to enhance the capability of the soldier to contribute to overall readiness. Almost all of these activities, short of going to war, take place on Army installations. Most can take place only there. Therefore, the challenge is to ensure that the installation as a base of readiness is a sustainable resource. The installation communities must be able to provide opportunities and to help soldiers to be successful now and long into the future. But for many installations it is a struggle to do that. Space available for training is diminishing while technology continues to expand the operating footprint for Army units at all echelons.<sup>7</sup> In addition, as the Makua Valley example demonstrates, the Army’s ability to use its technology and train its soldiers is increasingly compromised as neighboring communities raise concerns over the impacts of past and present activities on Army ranges.

Installation sustainability is therefore a key Transformation and readiness issue. The Army has reached a crossroads where it must reexamine the full spectrum of its operations. At issue is whether the Army’s current business practices support or compromise the long-term capability of Army installations to sustain the warfighting ability of present and future generations of soldiers.

Successful investment strategies that promote sustainable installations will reflect a shift in thought processes away from traditional materiel and facility requirements and instead examine the core forms of value (those key aspects of physical resources that contribute to readiness and well-being) that the Army—as an institution of soldiers—will need today and tomorrow to accomplish its missions. Installation leaders will also need to reexamine their long-term land use, training and Army family needs in light of resource competitors such as external development interests and environmental advocates.

## **Managing the Community: Sustainment of Army People**

An Army installation resembles a diverse city in the middle of a managed microecological region. It has a cantonment area that functions much like an American hometown and provides for the well-being of all members of the soldier community. Its services are a fundamental part of the social contract the Army makes with its people. The installation likely has a range area for mechanized maneuver or training that approximates farmland, and a natural buffer area for safety or noise control that in almost every respect exists as a wilderness area. The installation is further set in a larger ecological region that is under constant stress from the changing and growing human landscape around it.

The lessons learned from managing this complex community come in the context of a decades-long decline in financial resources for infrastructure, increasing environmental compliance requirements,

and mounting liability concerns. These issues have led to regular reexamination of how the Army meets its social contract with its soldier communities. In some cases (for example, privatization), the formula has been to replace the service provider to allow capital to flow into maintenance of assets. In other cases, the Army has reassessed the needs of the soldier community to provide more value while reducing wasted resources. Until recently, these programs have been implemented piecemeal, with varying results.

Utilities privatization changes the installation investment paradigm as it relates to ownership. Privatization, an Army policy initiative launched in 1991, simply takes the Army out of the business of owning, operating and maintaining utility systems.<sup>8</sup> Its value is derived from the shift of sustainment responsibility from installations to utility companies. After all, off-post utility companies already provide all natural gas, 99 percent of electricity and a substantial portion of potable water for installations. This initiative adds the on-post distribution systems and their requisite environmental requirements to the utility companies' responsibilities.

And it can work. A competitive contract privatized the wastewater treatment plant at Aberdeen Proving Ground, Maryland, eliminating the need for the installation to upgrade the facility to meet biological nitrogen-reduction mandates. Privatization of the Fort Belvoir, Virginia natural gas system in 1994 brought all-new gas lines meeting industry standards.<sup>9</sup>

However, privatization does not intrinsically address the issue of maximizing the value derived from utilities providers. The Energy Savings Performance Contract (ESPC) program takes the concept one step further. It exemplifies a case of a successful, sustainable investment strategy infused into one aspect of installation management. The Energy Policy Act of 1992 empowered federal agencies to use private-sector capital to finance ways to reduce energy consumption, but it wasn't until later in the decade that the value of the act to installation sustainability became clear.

In this innovative public-private partnership approach, private capital funds the state-of-the-art facility upgrades. Contractor earnings are directly indexed to how much energy is saved during the performance of the contract, a period of up to 25 years. The government pays only enough to cover the start-up costs of the contract effort. Under ESPCs, financial incentives are directly tied to providing the greatest value while using the least amount of energy. To accomplish this, wasteful activity and products must be eliminated. In a non-ESPC energy contract, the incentive is to provide energy without regard to the value derived from the energy investment.

Not only do ESPCs help the Army meet mandated energy reduction goals, but they also put the Army in the position of being a value obtainer as opposed to an energy consumer. The value—environmentally sustainable lighting, heating, and cooling for the installation—is now the focus. The energy infrastructure merely becomes the tool for value and, frankly, somebody else's problem. Investment in the delivery of value through greater efficiency and less waste becomes a prime goal of the contractor in order to reap greater profits. The Army ESPC program has provided \$378 million in contractor-funded infrastructure improvements, from family housing heat pumps at Fort Polk, Louisiana, to boilers at Fort Bragg, North Carolina. These and other investments have reduced installation emissions of carbon dioxide by 140,000 tons and sulfur dioxides by 150 tons each year.<sup>10</sup>

The Army's Residential Communities Initiative (RCI), a sister program to utilities privatization, shares with the latter the concept of conveying real property to another party for long-term (50 years) operation and maintenance. At Fort Hood, Texas, it will take between six and 10 years to fully move through the entire 6,000-plus housing units. Over five decades those same properties may be upgraded or renewed in some form every 20 years, just as they would be in the private sector. To finance these projects, the private-sector partners will leverage public funds with substantial private investment.

In addition, RCI adds the value of encouraging the development of community values beyond housing management and maintenance.<sup>11</sup> The incentives for making communities more environmentally sustainable are subtle—e.g., “cozy” small-town layouts to reduce car trips to service providers. The private-sector partners will design, build and operate livable communities for Army families that include the amenities and support services found and enjoyed in America’s most sustainable neighborhoods.

ESPCs, utilities privatization and RCI represent a layering of sustainable practices that are challenging traditional installation business processes. However, these three programs were not initiated or conducted by the Army in an integrated manner. The Army did not explore the relationships among them with an eye toward economic and environmental efficiencies throughout the installation. Without the installation-wide integration of solutions to facility, utility and environmental sustainability requirements, it is unlikely installations will gain full control of their ability to meet the needs of present and future soldier communities.

A step toward that integration came on 26 April 2000, when the Deputy Assistant Secretary of the Army (Installations and Housing) established a policy of incorporating Sustainable Design and Development (SDD) principles into installation planning and infrastructure projects.<sup>12</sup>

In response, the U.S. Army Corps of Engineers (USACE) developed the Sustainable Project Rating Tool (SPiRiT), a self-assessment rating tool that will help installations and designers quantify and measure the sustainability of infrastructure plans and projects.<sup>13</sup> The Army installation project sustainability rating is dependent upon eight facility categories: sustainable sites, water efficiency, energy and atmosphere, materials and resources, indoor environmental quality, facility delivery process, current mission and future missions. Army Headquarters<sup>14</sup> and USACE<sup>15</sup> policies require all Army projects to be scored against SPiRiT and to achieve the first level (bronze) for sustainable design and development. USACE conducts SDD workshops throughout its districts in an effort to educate its practicing designers of military facilities.

This program represents the first true effort for the Army to infuse sustainability planning into installation construction projects. However, it is likely that more opportunities to increase installation sustainability might be recognized if the installation were viewed as a total system of land and improvements supporting the needs of a specific type of community.

## **Training Space and Resource Competition**

Even with increased security isolating Army installations from easy public access, there is no way to turn back to a time when installation resources could be isolated from the readiness-limiting effects of external competition, regulatory restrictions or resource depletion. This challenge becomes more obvious when it affects the “rural” and “wilderness” areas of the installation—training or testing ranges and natural buffer areas.

The Army has identified urban sprawl toward installation boundaries, the disproportionate presence of threatened and endangered species on military training lands, increasing attempts at regulating the use of munitions and private-party lawsuits as major factors limiting realistic combat preparation to soldiers in representative battle spaces.<sup>16</sup> Army Transformation, with increased operational footprints, exacerbates this dilemma.<sup>17</sup>

The range, maneuver, impact and natural buffer areas supporting this realistic training environment are also valued for their aesthetic quality and contribution to biological diversity. This kind of natural resource capital is increasingly scarce. Frequently, Army installations resemble islands of biodiversity in a sea of unconstrained development. Species losing the battle against development and other

activity on land outside Army installations fare better inside the fence. This occurs because federal restrictions place a greater burden on federal landholders than on private interests to manage resources to the benefit of threatened and endangered species. Also, development is almost always more destructive to species habitat than are military training operations.

Because of this relative increase in and diversification of the value of installation land, development interests, neighboring communities and environmental activists now compete with the Army for effective control of the natural resources under Army stewardship. In this context, control has as much to do with how the natural resources are not used as it does about how they are used. In Makua Valley, the issue is not so much Army ownership of the range but the effects of operations on certain endangered plants and sites significant to native islanders. In other cases, development interests (occasionally working simultaneously or in conjunction with environmental groups) may be pushing for closure of or limiting use of certain areas.

The experience of Fort Carson serves as an example. There are two subdivisions adjacent to an engineer demolition training range at the Colorado post in spite of noise studies circulated by the Army to area developers to discourage them from encroaching on the installations training ranges. As one developer explained to the *Colorado Springs Gazette* in August 2001, "I just tell them [the buyers] when I sell them that Fort Carson is right there and it can be noisy. People don't call me and complain. I make it very clear. I just sell land, they choose to live on it."<sup>18</sup>

Fort Carson has had to install sensors in these neighborhoods to measure the shockwaves caused by the demolition training and has had to repair homes. The article states the subdivision residents "wouldn't dream" of asking the Army to stop demolition training. The residents stated that they could sell and move out, but that wouldn't solve the problem for those who moved into these subdivisions after them, or for the Army. The question isn't whether technology can be applied to determine the level of noise and vibrations in these subdivisions. The real question is, as these subdivisions develop over the years, whether they will continue to accept this incompatibility with Army training or take action to control it.

Without creative mechanisms to recognize and negotiate the needs of all of the resource competitors, the stalemate will break and private developments, species habitats and military operations will (individually or collectively) cease to be sustainable in the eyes, minds and hearts of the affected and interested local communities. As Ray Clark, Principal Deputy Assistant Secretary of the Army for Installations and Environment from May 1999 to January 2001, said, "The Army cannot unilaterally decide to put a tank range near the fence line of property recently approved for zoning as a subdivision."<sup>19</sup>

Just as in the cantonment area, the mechanism for creating a sustainable future for training ranges will begin with looking at value derivation rather than resource consumption. This is made difficult by a history of programs based simply on compliance with current environmental laws and regulations. Laws and regulations tend to be written based on resource consumption rather than on the concept of value derivation. Other competitors, such as developers, also base their planning on consumption.

When one looks at the underlying value competing communities derive from each resource, the possibility for better allocation and more satisfactory resolution exists. In addition, competing communities adjoining the land and its resources must generally accept the need for compromise. Even environmentalists and conservation agencies must appreciate that in the end they are advocating for compromise among what the land was before, what it has become since, and what it should or could become.

The case of Fort Bragg and its struggles to maintain training and recover an endangered species clearly illustrates how communities, agencies and interest groups can reshuffle the mechanism for deriving value from resources in a manner that allows all parties to meet their needs.

Fort Bragg is located in the North Carolina Sandhills, an ecoregion that supports the second largest population of endangered red-cockaded woodpeckers (RCWs) in the United States. As the only federal land manager in the region and host to clusters of these birds, Fort Bragg is required under the Endangered Species Act to take primary responsibility for their recovery. In Fort Bragg's case, it became apparent that it would need to look outside the post to private lands to have any chance of bringing RCW population numbers back to sustainable levels and gaining access to lands usable for needed training.

The solution is called the Private Lands Initiative, a prime example of an Army conservation partnership with a private, nonprofit conservation organization to meet conservation goals and restore Army access to training lands. The U.S. Fish and Wildlife Service agrees to the methodology and the goals of the Army partnership with The Nature Conservancy (TNC). This arrangement provides the capability to fully fund and manage lands acquired for the purpose of species recovery. By law, the Army cannot acquire private lands to increase habitat. Instead, TNC matches Army funding, offers and negotiates for suitable private property, acquires the deeded interest in the property and provides for the long-term management of the habitat to foster recovery of the endangered woodpecker. TNC also provides Fort Bragg with access to acquired properties to conduct compatible military training in accordance with the conservation agreement.<sup>20</sup>

The whole initiative is an exercise in "value trading" that transcends consumption of resources. Each party sought the best way to derive needed value rather than dominate resources. The Army decreased its habitat management responsibility (negative value to readiness) and acquired access to needed training space (positive value to readiness). TNC leveraged to gain control of species recovery (positive value to conservation) and avoided competition with private property owners and the military (negative value to conservation efforts). Private land owners divested themselves of viable species habitat subject to regulation and noise corridors (reducers of commercial value) and derived sufficient monetary compensation (positive commercial value).

The Private Lands Initiative provides an example of how to integrate the military mission with economic viability and community support consistent with environmental and installation sustainability goals.

## **Managing Training Space for Sustainability**

The challenges to the sustainment of realistic training on Army installations are not merely external. Left to itself, live-fire training and maneuvering would epitomize unsustainable activity. In fact, some areas of installations in the not too distant past resembled scenes from the Dust Bowl or World War I trench warfare—shorn of cover, impassable by tanks or infantry, with no resemblance to anywhere 21st century soldiers might engage the enemy. With resultant regulatory constraints and loss of stable land for freedom of movement, the Army would not be providing for training needs in the future. As recently as 1994, severe erosion gullies on Sicily Drop Zone at Fort Bragg were injuring paratroopers, and water runoff left the installation facing a notice of environmental violation from the state.<sup>21</sup> An eight-year, \$3 million project eliminated the environmental problems and created a safe and effective training site—in perpetuity, with good management.

That management is available the Army under the Integrated Training Area Management (ITAM) program, which incorporates practices designed to maximize the potential of realistic training on Army

land. ITAM is an administrative tool for monitoring and evaluating the impact of military activity on training and testing ranges. The condition of the land determines the type and level of training that can be conducted. The process incorporates sound environmental stewardship while ensuring space for demanding, realistic training.<sup>22</sup> The success of this program since its establishment in the early 1980s led to ITAM becoming a requirement for installations with a major training or testing mission in 1998.<sup>23</sup> ITAM serves as an example of an integrated approach to sustainment of soldier readiness.<sup>24</sup> But land maintenance isn't the only challenge to sustainability.

An enduring reality of live-fire training activities is the unexploded ordnance (UXO). UXO represents an environmental compliance issue for Army ranges and is also a prime enemy of efforts to achieve overall installation sustainability for several reasons.

First, the presence of UXO limits access to the land as a resource and can possibly pose a human health risk from either detonation or leaching of contaminating components into the soil. Second, regulators tend to view ranges as wastelands that pose toxic-waste risks. Environmental regulations can broaden the restrictions on access to the land while conventional cleanups can destroy natural and cultural resources on Army ranges. Finally, focusing on cleaning of already-contaminated areas takes financial resources that might be better applied to development of sustainment techniques and technologies.

UXO and even the remedial activities associated with UXO cleanup can both compromise the needs of the present while degrading the value of resources that could serve future generations. The key to achieving more sustainable live-fire training lies in employing technologies and techniques that permit the soldier to train freely without compromising the value of the training lands.

On small-arms ranges, sustainability is threatened by the potential of lead migration through soil erosion. Lead was an issue when EPA temporarily ended firing at Camp Edwards, Massachusetts. Soldiers were allowed to train with M-16s again only after the Army began fielding its "green" bullet—so named for its lead-free projectile.<sup>25</sup>

Green bullets, made of environmentally inert tungsten, represent just one of several technological solutions aimed at creating more environmentally sound and sustainable ranges while meeting warfighting standards. Green-bullet research was well underway when EPA issued its closure decree for Camp Edwards, demonstrating how research into an environmental concern can suddenly provide real benefits to operational sustainability.

The long-term investment benefits, however, were a driving force for green-bullet development. With the cost of potential cleanup factored in, the tungsten rounds will cost substantially less than their lead-based counterparts. Environmental impacts vary depending on site conditions, but the cost of removing hazardous metals from soil can range from \$100 to \$300 per cubic yard.

Other small-arms range investments look at the range design itself. Research into soil erosion and lead migration has brought about new designs for small-arms ranges that will reduce or eliminate range maintenance and detrimental environmental impacts. The range at Fort McPherson, Georgia, opened 24 September 1997, employed high-tech polymers used in farming and construction designs to stabilize riverbanks. The result provides realistic training and reduces maintenance as well as reducing erosion.<sup>26</sup>

The Army has also done extensive research into other methods of erosion prevention, including bullet traps.<sup>27</sup> Environmental technology is proving to be a cost-effective way to sustain operational readiness in the face of regulation and the increasingly complicated requirements necessary to maintain

the Army's range lands. The direct benefits will be better training facilities, reduced environmental compliance costs, and lower life-cycle operating and maintenance costs. The indirect benefit is the value well-managed lands provide—sustainable training.

## **Transforming the System**

The Army's internal competition for financial resources further diminishes the installation's ability to look comprehensively at all resource elements that could affect the sustainability of soldier readiness. Major General Robert Van Antwerp, Jr., Assistant Chief of Staff for Installation Management from February 1999 to July 2002, estimated that installation base operations and sustainment, recapitalization, and maintenance (SRM) accounts averaged 50 percent below requirements during Fiscal Year 2002.<sup>28</sup> He ascribed that lack of funding to a "migration" of base operations and SRM funds to other needs, such as force protection and Operation Enduring Freedom. This recurring resource competition has exacerbated the traditional and persistent separation of cantonment sustainment issues from range and training area sustainment issues.

A change in the concept of installation management may overcome that hurdle. The new Installation Management Agency under the Assistant Chief of Staff for Installation Management is designed to support garrisons with funds protected from local-level "raiding." Regional directorates will implement policies and programs, direct and oversee execution and enforce Army-wide standards at installations. This concept commits the Army to manage facilities for the best reinvestment and gives the Army a means to focus the application of scarce resources where they are needed most. The new agency will support the integrated approach to investments that is an Army imperative as installations restructure to support changing missions.

Army Master Planning was meant to fill that kind of role. It should define installation needs over time and fit them into a workable network of construction projects and land use matched to the landscape and mission requirements. However, it often falls short of this mark, becoming little more than a list of projects with some determinations of feasibility for site locations. Even if master planning were conducted as traditionally intended, it would fail to address how to assess the interdependency of facilities necessary to optimize the efficient use of resources and achieve greater sustainability of operation of the installation as a system.

## **Recommendations: An Institution Sustaining People to Sustain Readiness**

The challenge for the Army as it implements centralized installation management will be to provide a systematic approach to installation sustainment. Therefore, new initiatives must focus on enhancing the value of products or services rather than on simply providing different ways to deliver the same thing. This will require long-term foresight that aligns business processes, technology, environmental programs and infrastructure to reflect actual needs as opposed to preserving preconceived notions based on historical practices and institutional momentum. Products and services must be examined to determine the actual value provided. The environmental programs' increased emphasis on Environmental Management Systems (EMS) and its acceptance and advocacy by the range sustainment community are evidence that the Army is turning toward this philosophy of "needs"-based management of the environment. Capitalizing on these efforts to make mission and soldier sustainment the guiding force to all environmental activities will greatly increase the prospects of managing for sustainment as opposed to responding to compliance concerns. EMS puts the basic tools for environmentally sustainable management into the hands of the Army "property owners and operators" such as range managers so they can maximize their service to present and future generations of soldier communities.

Financial investments must be loaded in favor of long-term performance in delivering value as opposed to short-term reduction of costs. At every turn, wasteful activity as well as generation of wasteful products must be minimized or eliminated. To make financial investments for sustainability work smoothly, the true cost of waste must be factored into the accounting for program costs. Unfortunately, the current financial management system segments funding and fund control in such a manner that those most responsible for sustaining installations are not able to design an installation management system that includes all of the factors that degrade long-term capacity of installations to sustain readiness. For example, within the environmental program, there remains a segmentation of activity funding based on the construct of the “four pillars”: conservation of natural and cultural resources, regulatory compliance, pollution prevention and environmental restoration. To make an Army installation sustainable, all activities and all resources must be evaluated with regard to their connection to sustaining the total soldier community, from their well-being to training needs.

Finally, there is a need for the Army to institutionalize a reinvigorated master planning methodology into its centralized installation management that integrates sustainable development and design principles at the installation-wide level to include those land-uses traditionally separated from cantonment area concerns.

If the Army does not take the steps to look at a new concept of value for its soldier communities and invest wisely in that value, its future could be locked into a chain of limits and compromises of which Makua Valley would serve only as an early example.

## Endnotes

- <sup>1</sup> Gregg K. Kakesacko, “Tragedy in New York Lifts Makua Impasse,” *Honolulu Star Bulletin*, 5 October 2001.
- <sup>2</sup> William Cole, “Army to Reopen Debate on Makua Live-Fire Training,” *Honolulu Advertiser*, 25 March 2002.
- <sup>3</sup> *Ibid.*
- <sup>4</sup> *The Army Vision: Soldiers on Point for the Nation—Persuasive in Peace, Invincible in War* (Washington, D.C.: Office of the Chief of Staff, Army, February 2000). Online briefing at <http://www.army.mil/vision/Chain.htm>, accessed 3 April 2002.
- <sup>5</sup> “Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” World Commission on Environment and Development (WCED), *Our Common Future* (Oxford: Oxford University Press, 1987), p. 43. Also known as the “Tokyo Declaration,” sometimes attributed to commission chair Gro Harlem Bruntland.
- <sup>6</sup> “Sustainability: The capability to maintain the required level (intensity) and duration (time) of military operations to achieve the planned objectives or outcomes. It represents the balanced capability for all logistics and combat service support (arm, fix, fuel, move and soldier support) functions which provide the staying power, over time, for the supported force. Includes the force structure, prepositioned and war reserve materials, prescribed loads and operating stocks, and the wholesale sustaining and industrial base which in their totality comprise Army capability to project and reconstitute the Total Army Force.” Army Regulation 700-138, *Army Logistics Readiness and Sustainability* (Washington, D.C.: Department of the Army, 16 September 1997), Glossary.

- <sup>7</sup> Joe Burlas, “Encroachment, Regulation Affect Training, Van Antwerp Tells Congress,” *Environmental Update*, Summer 2001, p. 3. See also the 20 March 2001 testimony by Maj. Gen. Robert L. Van Antwerp, Jr., Assistant Chief of Staff for Installation Management, before the Senate Armed Services Committee Subcommittee on Readiness and Management Support.
- <sup>8</sup> Assistant Chief of Staff for Installation Management, “Privatization of Army Utility Systems, Update 1 – March 2000: A Guide for Garrison Commanders,” brochure.
- <sup>9</sup> John B. Nerger and William F. Eng, “Privatizing Army Utilities–Post 9/11,” *Public Works Digest*, March–April 2002, pp. 21–2.
- <sup>10</sup> Bobby Starling, “Huntsville’s Energy Saving Performance Contracting (ESPC) Program,” *Public Works Digest*, March April 2002, p. 23.
- <sup>11</sup> Assistant Chief of Staff for Installation Management, “Army’s Residential Communities Initiative (RCI) Privatization Program,” information paper issued 27 December 2000.
- <sup>12</sup> Paul W. Johnson, Deputy Assistant Secretary of the Army (Installations and Housing), “Sustainable Design and Development,” memorandum issued 26 April 2000. See also Office of the Assistant Chief of Staff for Installation Management, “Sustainable Design and Development: A Guide for Army Garrison Commanders,” available at <http://www.cecer.army.mil/SustDesign/Sustainable.pdf>.
- <sup>13</sup> SPiRiT is an adaptation of the U.S. Green Building Council’s Leadership in Energy and Environmental Design Building Rating System (LEED) used by industry. An executive summary is available at <http://www.hqda.army.mil/acsim/fd/docs/spiritexecsumm2.doc>. SPiRiT is available online at <http://www.hqda.army.mil/acsim/fd/docs/SPiRiTv14Final.doc>.
- <sup>14</sup> Maj. Gen. Robert L. Van Antwerp, Jr., Assistant Chief of Staff for Installation Management, “Sustainable Project Rating Tool (SPiRiT),” memo issued 4 May 2001.
- <sup>15</sup> Brig. Gen. Steven R. Hawkins, USACE Director of Military Programs, “Sustainable Design and Development,” memorandum issued 1 June 2001.
- <sup>16</sup> Maj. Gen. Robert L. Van Antwerp, Jr., Assistant Chief of Staff for Installation Management, Statement on “Encroachment” Issues Having Potentially Adverse Impact on Military Readiness, 20 March 2001, before the Subcommittee on Readiness and Management Support for the Senate Armed Services Committee, First Session, 107th Congress.
- <sup>17</sup> Robert M. Lacey, “Land Use Planning and Sustaining the Military Land Base,” paper presented at the Sustaining Base Leadership and Management course at the Army Staff College 13 March 2001, p. 7. The document is published on the U.S. Army Corps of Engineers website, <http://www.hq.usace.army.mil/isd/librarie/RP/Land%20Use%20Planning%20and%20Sustaining%20the%20Military%20Land%20Base.pdf>.
- <sup>18</sup> Bill Vogrin, “Fort Carson’s Noise Rattling the Neighbors,” *The Colorado Springs Gazette*, 13 August 2001.
- <sup>19</sup> “Former Army Official Lays Out Lessons for Installation Sustainability,” *Defense Environment Alert*, vol. 9, no. 10, 8 May 2001.
- <sup>20</sup> Robert Dimichele, “Land Initiative Partners Open Conservation Outreach Office,” *Environmental Update*, Winter 2002, p. 5.

- <sup>21</sup> Robert DiMichele, “Erosion Control Supports Airborne Readiness,” *Environmental Update*, Spring 2002, p. 4.
- <sup>22</sup> “Army Continues to Improve Integrated Training Area Management,” *Environmental Update*, January 1996.
- <sup>23</sup> Army Regulation 350-4, *Integrated Training Area Management* (Washington, D.C.: Department of the Army, 1998), p. i.
- <sup>24</sup> Integrated Training Area Management (ITAM) could easily become the subject of another essay. For more information, visit the website at <http://www.army-itam.com>.
- <sup>25</sup> Neal Snyder, “Small Arms Fire Continues on Massachusetts Range,” *Environmental Update*, Winter 2002, p. 3.
- <sup>26</sup> Mike Buckley, “Readiness and Stewardship On Target at Fort McPherson Range,” *Environmental Update*, Winter 1998.
- <sup>27</sup> The manual *Prevention of Lead Migration and Erosion from Small Arms Ranges*, produced by the U.S. Army Environmental Center and the U.S. Army Training Support Center (1998), outlines many of these technologies and the specific areas to which they might apply.
- <sup>28</sup> Erin Q. Winograd, “Base Operations, Maintenance Accounts Running into Critical Deficits,” *Inside the Army*, 13 May 2002, p. 2.

[Colonel Stanley H. Lillie is currently serving as Chief, Full-Dimension Protection Division, Office of the Deputy Chief of Staff for Programs, Department of the Army. He previously served as Commander of the U.S. Army Environmental Center.

Paul A. Martin coordinates environmental impact analyses and National Environmental Policy Act compliance for Army Transformation at the U.S. Army Environmental Center.]