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Key Trends That Will Shape Army Installations of Tomorrow

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Summary

Background

For decades, Army installations tended to be isolated, which meant that they could train and carry out other activities largely unimpeded. Today, however, Army installations find themselves having to deal with an increasing number of external pressures. Expanding development is causing more and more houses to be built ever closer to installations, leading to concerns among residents about noise and safety, which in turn threaten to curtail training. The same development is making installations part of the remaining habitat for endangered plant and animal species, which puts increasing pressure on the installation to preserve species and habitat. Where once water was plentiful, it is now less so and even scarce in some areas. Thus, installations come under increasing pressure, either to share resources or to reduce consumption. Installations also find themselves asked to use less electricity, build more energy efficient structures, adopt new information and other technologies, cope with trends affecting society at large (such as the rising use of online social networks as part of Americans' sense of community), and find ways to reduce traffic congestion. And all of this occurs at a time when resources are likely to be less plentiful than in the recent past.

Purpose and Approach of the Research

None of these trends has escaped the notice of Army leaders. In response, the Office of the Assistant Chief of Staff for Installation Management (OACSIM), which conducts strategic planning to help shape the Army's installations, asked RAND Arroyo Center analysts to help assess how future trends external to installations, including technologies, policies, infrastructure changes, and other factors, could influence installations out to 2025. More specifically, the project objective was to examine trends external to Army installations that may affect its ability to provide quality installation services and infrastructure and that the Army should take into account in strategic planning. A second objective was to specify near-term and longer actions that the Army should take to address these trends.

The broad approach our Arroyo research team took was to review the relevant literature from academia, nongovernmental organizations (NGOs), industry, military and intelligence agencies, other federal agencies, and even state and local governments. We began by looking at a wide range of future trend studies and at literature in specific areas that would likely

impact installation infrastructure, services, and operations, such as information, buildings, energy, environmental and transportation technologies, policy, and management. The results of the literature review were bolstered by interviews with relevant experts.

The next step took a systems analysis approach to assessing the potential effects of trends on Army installations. This systems analysis consisted of four main steps:

- Identify and understand key relevant current trends and projections that appear to be most relevant for Army installations.
- Examine the causes of the trends and likely changes over time as well as the policies and activities that could change the trends and their effects.
- Examine the key interrelationships of these trends with other trends and installation processes and functions.
- Assess the significance of any relevant potential effects of the trends on Army installations.

Based on this analysis, we focused on trends that appeared to have the potentially largest impact, whether negative or positive, on Army installations' ability to provide quality services and infrastructure. These impacts could include significantly limiting or enhancing installation operations, incurring significant costs or saving the Army money, helping to meet or hurting the ability to meet future regulations and requirements, and helping to improve or potentially hurting Soldier and Family quality of life.

Given this analysis, we determined that the trends listed in Table S.1 were the ones most relevant for Army installations. Note that these trends are not presented in any particular order.

Conclusions and Recommendations

We developed some general and cross-cutting conclusions and recommendations as well as those that are specific to each trend area.

Overarching Conclusions and Recommendations

In examining external trends to Army installations out to the year 2025, we found that such trends are likely to impact installations in many different ways and in many different areas. Trends have the potential to cause harm to such installation operations as testing, training, and constructing activities; to cost or save the Army significant amounts in the future; to hurt or improve Soldier and Family quality of life; to improve installation operations; to help meet future installation requirements; and to improve or hurt environmental conditions.

**Table S.1
Trend Areas Examined as Most Relevant for Army Installations**

Trends	Illustrative Characteristics
Loss of biodiversity	Trends of biodiversity loss throughout the world and their effect on Army installations.
Urbanization, increased development, and sprawling communities	Growth in cities throughout the world and the U.S., and increasing sprawling communities in the United States, including in rural areas.
Climate change	Potential implications of climate change, including changes in snowfall and rainfall patterns.
Water scarcity	Global and U.S. trends in scarcity, implications of long-term drought, and water conservation measures.
Sustainable communities	Growth management, traditional neighborhood development/new urbanism, eco-industrial parks, and waste management.
Sustainable transportation	Compact land use and less personal vehicle travel, personal mobility options, and transportation system planning.
Sustainable agriculture	Community-supported agriculture, organic farming, and community gardening because of obesity, weight, nutrition, and health concerns.
Sustainable buildings	Increasingly greener building codes and voluntary standards, and evolving best practices for building management.
Energy	Growth in renewable energy technology implementation, and increasing requirements and investments in energy efficiency.
Information technologies	Online communities, pervasive computing, and robotics.
Societal	Trends in the ways people live and their relationships with each other and the world around them, including changes in U.S. society, trends and implications for youth, and use of the Internet.

The Army also has the ability, with strategic actions, to mitigate potentially negative consequences on its installations from the trends and to take advantage of their potentially beneficial opportunities. It is important that the Army consider and implement the types of actions identified in this study both in the near term and in its strategic planning to help save costs, to preserve installation operational flexibility, improve Soldier and Family quality of life, and to help meet installation requirements. Given the uncertainty with so many of these trends and knowing that they will evolve over time, the Army should continue to examine them, as well as others as they become relevant, and assess their implications for Army installations and actions. Our study provides a methodology and process that the Army can use for continuing assessment. This process includes key questions to ask and answer about the trends and sources to use to help answer them.

We also identify an issue that cuts across many different trend areas: that of community relationships becoming more important to Army installations. Community relationships include the local community, broader regional communities, and networks of communities with a shared interest, such as supporting Army Soldiers and Families or collaborating in regional ecosystem management. First, we noticed that communities are likely to be more interested in installation operations than in the past, and this is likely to continue into the future. Because of increased community interests in installations, Army installations will need to spend more time on community relationships. Second, community relationships are becoming more important for addressing external trends' influences and likely impact on installations, from the need to work with communities to prevent encroachment from sprawling home developments near an installation, to working together on Soldier and Family quality of life issues, to regional collaborative ecosystem management to prevent biodiversity loss. The need to consider the local, regional, and networks of communities with common interests and to collaborate with them will become more and more important to installations in the future.

Trend Area Conclusions and Recommendations

To help identify priority actions for the Army installation community today, we created different categories of actions based on the likely effect the trends will have on the Army. Specifically, the trends in this study fall into the following six categories:

1. Treat strategically now to avoid future harm to military operations.
2. Treat strategically now to avoid high future costs.
3. Treat strategically now to improve capability to meet future regulations and installation requirements.
4. Treat sooner because of the opportunity to get some benefits. Benefits can include meeting future requirements, saving money, and improving Soldier and Family quality of life.
5. Trend requires additional research or studies to better understand its impact on the Army and Army installations.
6. Trend requires tracking but not immediate action.

However, some trends cut across categories. It is important to note that the categories generalize based on likely main effects and that each area is complex. For the more complete and detailed situation of each trend, the reader should read the individual chapter on that trend. Table S.2 shows which trends fall in each general category. A red cell means the trend

**Table S.2
Trends Examined and Their Potential Impact**

Trend Area	Trend Category					
	1: Avoid Future Harm to Operations	2: Avoid High Future Costs	3: Meet Future Requirements	4: Opportunity for Benefits	5: Additional Study	6: Tracking but No Action
Loss of biodiversity	Red	Red	Gray			
Urbanization, increased development, and sprawling communities	Red	Red				
Sustainable buildings		Red	Gray	Gray		
Energy		Red	Red			
Sustainable transportation		Red	Gray	Red		
Water scarcity		Gray	Red			
Sustainable communities		Gray	Gray	Gray		
Societal trends				Gray	Gray	
Sustainable agriculture				Gray		
Online communities				Gray		
Climate change					Gray	
Robotics						Gray
Pervasive computing						Gray

Red = high priority/impact. Gray = important but requires less urgency of action.

is likely to have a more significant influence in that area and will likely require higher-priority actions. For example, the trend area “sustainable buildings” is likely to imply significantly higher potential future costs if not considered soon; the trend area is likely to have some effect on meeting future regulations and requirements, but this is not ranked as significant in terms of near-term actions.

The research resulted in a substantial number of findings and recommendations. Here, we provide the main ones for the areas marked in red in Table S.2 as having significant influence and requiring a higher priority. It is important to note that other areas examined indicated by gray cells are important to Army installations as well, but they did not currently appear to require as much urgency of action given current trends and Army actions. For example, trends in online communities are significant to Army installations of the future, and addressing them sooner with our suggested recommendations will potentially provide benefits to Soldier and Family quality of life, but given what the Army is already doing and

how the trends are evolving, not taking action soon will likely not incur significant harm or costs for Army installations.

Biodiversity Loss

Biodiversity loss is a significant trend throughout the world and the United States. This trend will probably continue and perhaps even accelerate, which is likely to result in more threatened and endangered species and pressures from federal, state, and local governments to protect them. This trend would probably lead to more restrictions on Army installation operations such as training, testing, and construction.

The Army should take strategic actions now to mitigate future effects of biodiversity loss, such as participating in collaborative ecosystem management. Army installation ecosystem management programs should continue and be strengthened. Additionally, the Army should take a lead role in collaborating with federal, state, and local governments; private companies and individuals; and NGOs to prevent biodiversity loss. The Army should continue to fund Army Compatible Use Buffering (ACUB) activities and identify which installations' ecosystems are most at risk and ensure that installations are collaborating with other organizations to preserve ecosystems. Senior Army and Department of Defense (DoD) leaders should meet with senior levels of Department of Interior and the U.S. Department of Agriculture to ensure they are adequately funding, managing, and protecting biodiversity in ecosystems where there are military installations and fully participating in relevant regional collaborations to protect biodiversity.

Urbanization, Increased Development, and Sprawling Communities

Sprawl and other land development pressures near installations are likely to continue. Such pressures cause encroachment on military installations, which can create a range of problems including more threatened or endangered species; wetlands, water, and air quality problems; competition for airspace and radio frequency spectrum; and more noise, smoke, and other complaints from the community about Army testing, training, and other installation operations.

The Army needs to address encroachment strategically and aggressively now. If not addressed soon, encroachment will likely cost the Army significantly more in the future to deal with it. The Assistant Chief of Staff for Installation Management (ACSIM) and the HQDA G-3 should take a lead role establishing a high-level organizational element that is responsible for integrating efforts across different parts of the Army, including training, testing, environmental, and community outreach organizations. The Army should develop an integrated, comprehensive, and strategic encroachment action plan that includes diverse

effective ways to address different encroachment factors and that includes all relevant parts of the Army. Again, ACSIM should lead such an activity. The Army should implement more buffering and other mitigation activities, including dedicated funding for ACUB, and should also identify now the installations most at risk for biodiversity loss and species issues to help focus resources.

Sustainable Buildings

A number of trends will shape future buildings. State and local building codes, voluntary standards, and labeling programs will set increasingly higher performance goals, and best practices for building management, including building commissioning, life-cycle analysis, and proper operations and maintenance (O&M), will become more important. Federal legislation, Executive Orders, and DoD policies will likely continue to increase building sustainability requirements, as will state and local governments adopting more sustainable building policies. Finally, green procurement, life-cycle analysis, and designing buildings for reducing waste and deconstruction will receive more emphasis.

We make four recommendations for the Army regarding sustainable buildings to help save the Army money, to help meet future requirements, and to improve building operations and environmental quality. First, the Army should make it policy to strive to design buildings to exceed Leadership in Energy and Environmental Design (LEED)¹ Silver standards and give attention to regional and local priorities.² Properly investing now in energy and water efficiency improvements will provide years and even decades of savings. Second, the Army needs to ensure it is getting the cost savings from higher-performance buildings by requiring third-party certification for LEED building performance (both new construction and existing buildings) and improve building operations and maintenance practices. The Army

¹ LEED is a well-known green building standards approach, but it is not without controversy. Some in the architectural community claim that LEED allows developers to reap the public relations benefits of building “green” without ensuring sustainability. For example, see Abby Leonard, “Architect Frank Gehry Talks LEED and the Future of Green Building,” PBS, June 14, 2010.

² The NDAA of 2011 (Section 2830) prohibited the use of funds to be used for the LEED Gold and Platinum certification. Waivers are allowed if the Secretary of Defense submits notification that includes a cost-benefit analysis of the decision and demonstrates payback for the energy improvements or sustainable design features. Where possible the Army should do such analyses and submit such notification. So even though it is difficult to do right now given the NDAA of 2011 legislation, the Army should strive to have a policy to design buildings to exceed LEED Silver given appropriate implementation and cost-benefit analyses.

needs to ensure that its policy that new buildings will have third-party certification starting in FY13 occurs, and that such certification also applies to existing building renovations. The Army should also increase the use of continuous building commissioning to ensure that the benefits from capital investments are realized. Third, the Army needs to ensure that life-cycle analysis is used to minimize total costs. Fourth, the Army should place more emphasis on green procurement and designing buildings for reducing waste and deconstruction. We also have several specific recommendations for ACSIM and Installation Management Command (IMCOM) and other Commands that maintain buildings. They should assess the progress, barriers, and needed improvements in Army sustainable building implementation, green procurements in buildings, and designing buildings for reducing waste and deconstruction. They should also assist installations by helping to identify and evaluate the effectiveness of the many options for improving building performance and lowering costs. They should also support installation demonstrations of new technologies and evaluate their performance, such as green roofs. Lastly, they should facilitate installation investment in technologies that are demonstrated to be successful.

Energy

The demand for and the price of energy will continue to rise. Traditional energy sources will provide most U.S. energy, but the use of renewable energy and biofuels will grow. Renewable power generation capacity and use of natural gas are growing and expected to continue to do so. As this use and capacity of renewable energy technologies grow, they will become more cost competitive. Further, energy use and management will become smarter, more efficient, and more reliable. Lastly, federal, DoD, and Army policies are increasing requirements for energy efficiency and renewable energy, which places more pressures on Army installations to invest in energy efficiency and renewable energy technologies.

The Army should accelerate its efforts to improve energy efficiency and lay the foundation to implement more rigorous standards to save money over the long term. Installations will need to improve the energy efficiency of their buildings because of likely stricter OSD, Army, and even state requirements. For new construction, the Army should set a goal to be at least 65 percent more efficient than the ASHRAE 90.1-2004 standard. ACSIM should do a cost-benefit analysis to show the savings of such a standard over time to help its justification and implementation. Also, the Army should have a headquarters organization with the expertise to help installations with technical, financial, legal, and contracting issues regarding large-scale energy efficiency and renewable energy investments. Additionally, ACSIM and IMCOM and other Commands should help installations by

supporting demonstrations of new energy technologies and evaluating their performance. They should also help installations collaborate more with utilities and industry to develop renewable and other energy resources or infrastructure and help installations identify low-cost opportunities to procure renewable power for sources inside and outside installations. Finally, ACSIM and IMCOM and other Commands should help installations promote competitive hiring and salaries for full-time energy managers and staff at installations.

Sustainable Transportation

Emphasis is increasing on compact land use and less personal vehicle travel. Additionally, more transportation system planning and operations improvements are being developed and implemented. Third, increasingly many and increasingly diverse personal mobility options, such as car sharing, are being implemented. Finally, more electric and other alternative energy vehicles are being developed and put into service.

ACSIM/IMCOM should encourage installations in master and transportation planning to do more compact land use and traditional neighborhood development practices and promote policies that decrease personal vehicle travel. Large installations should have free or low-cost and convenient post buses. More efforts should be made to partner with local governments and communities on providing transit. Designing bike lanes and bike racks for bike parking in key cantonment areas is another important activity. ACSIM/IMCOM should encourage installations to do more transportation system planning and operations improvements to ensure efficient flow and management of traffic and other transportation infrastructure. IMCOM should help installations implement more low-cost or even free car sharing pilot demonstrations, especially at large posts that have population growth and transportation problems. IMCOM should also explore doing a free or fee-based shared bicycle system or even a multi-modal system installation pilot that involves bicycles and cars. Finally, the Army should ensure the effective and efficient use of electric vehicles by comparing the costs and benefits of different alternative vehicle types and uses and planning for the electric charging infrastructure.

Such strategic installation transportation planning and investments now can help save costs; save valuable installation land space; improve installation quality of life; reduce traffic congestion, reduce air pollution and other environmental problems; help preserve installation operational flexibility from air quality and other regulations; and help meet future federal, OSD, and Army energy requirements.

Water Scarcity

Water has become increasingly scarce globally and in the United States, and this trend will likely continue. Army installations will need to cooperate more with local communities to manage scarce water resources and develop more aggressive water conservation methods and policies. The Army should place more emphasis, analysis, and visibility on water concerns now; the Net Zero Water Installation activities are a good start. Additional beneficial steps to implement include an analysis using installation and regional water case studies to examine likely installation implications and needs. ACSIM/IMCOM in collaboration with the Deputy Assistant Secretary of the Army for Environment, Safety and Occupational Health (DASA(ESOH)) within the Assistant Secretary of the Army for Installations, Energy and Environment (ASA(IE&E)) should develop an integrated strategic action plan that integrates future trends and scenarios and focuses on specific actions to deal with regional differences and needs. Lastly, individual installation sustainability and strategic plans should place more emphasis on long-term strategic approaches to water issues.

Conclusion

Many trends external to Army installations have the potential ability to help or hurt installations of the future. By examining such trends now and acting to address their implications for installations of the future, the Army can better take advantage of the beneficial ones and mitigate the impacts of the harmful ones to preserve installation operational flexibility and provide quality installation services and infrastructure. Such actions will ultimately save the Army money and improve installation operations and Soldier and Family quality of life.