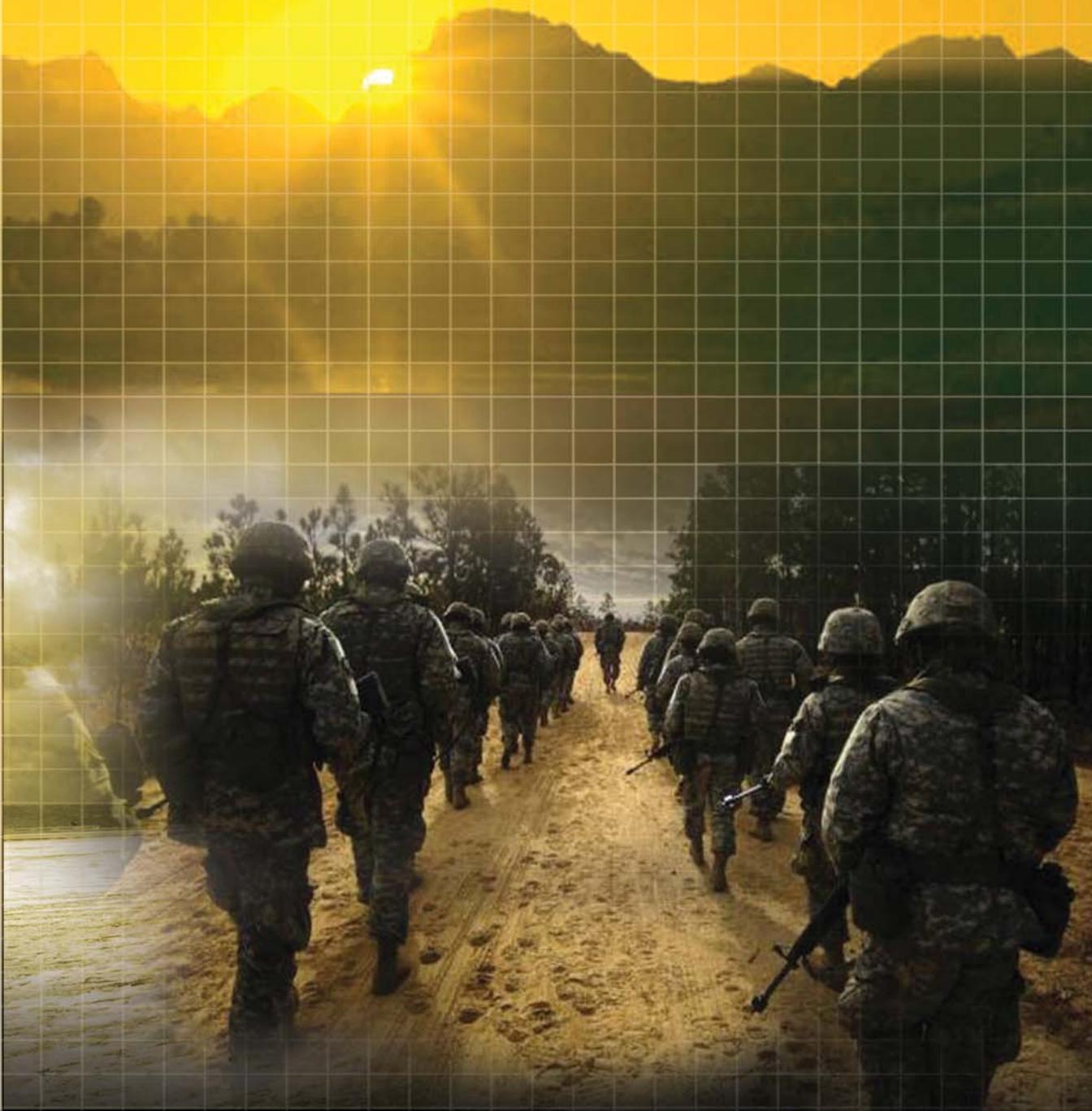




**JUNE 2011: PROTECTING CRITICAL
BENEFITS RECEIVED FROM ECOSYSTEMS**

ARMY FORESIGHT

SEARCHING FOR SUSTAINABILITY



**EDITION
3.2**

How can the Army account for ecosystem services and then manage ecosystems to ensure continued flow of these benefits to the military mission?

ARMY FORESIGHT

SEARCHING FOR SUSTAINABILITY

INTRODUCTION TO FORESIGHT PROCESS

Welcome to the Army Environmental Policy Institute's (AEPI) Foresight report series. Each edition focuses on a current topic on AEPI's "radar screen". It presents key points from AEPI's preliminary research in a short report. Foresight introduces a specific topic, discusses the topic's importance to the Army, and highlights several key areas for further study. This is the second report in a series addressing the importance of ecosystem services to the Army."

Foresight improves the ability to look forward. AEPI deliberately and methodically gathers intelligence to follow trends and identify emerging issues. Foresight extends three years and more into the future — offering directions, not making predictions. The issues identified have the potential to affect the Army's ability to achieve its mission and warrant immediate attention.

The Foresight series helps achieve sustainability by improving policy today to prevent current undesirable trends from becoming future intractable issues. Foresight includes three components: systematic scanning of trends, encouraging participation and buy-in, and building vision to improve policy.

The Foresight process is ongoing. Topical specialists continuously track issues and offer topics for discussion, recognizing the present and creatively considering the future. The Foresight reports are offered to interested parties to solicit comment and encourage sharing. Foresight is designed to generate discussion and invite collaboration with our military partners and potential collaborators in science, academia, industry, and other organizations.

The AEPI mission is to assist the Secretariat with the development of proactive policies and strategies to address environmental issues that may have significant future impacts on the Army. AEPI invites you to join them on the journey in the search to sustain the Army mission and secure the future. To register your comments on this issue, please contact AEPI at 703-604-2305 or aepi.administrator@hqda.army.mil.

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THE ISSUE: PROTECTING CRITICAL BENEFITS RECEIVED FROM ECOSYSTEMS

WHY ECOSYSTEM SERVICES?

Ecosystem services are the benefits people receive from ecosystems. Economic markets account for many of these benefits such as

Ecosystem services are the benefits people receive from ecosystems.

the provision of food and fiber, thus ensuring continued supply. But goods and services traded on the market are not the only benefits people receive from ecosystems. There are many others which are not accounted for – either in monetary terms or any other terms – such as erosion control, disease modulation, wave attenuation, water purification, or pollination. The value of services from ecosystems are often underestimated or ignored, making it difficult to protect the ecosystem structure and function that underlie provision of the services (refer to Figure 1).¹

The concept of ecosystem services has emerged to address this challenge by ensuring they are identified, quantified and included in land use planning and management. It has proven to be a useful interdisciplinary term, with several fields of practice adopting it as a framework for ecological research and economic accounting systems; for enhancing conservation; and for improving natural resource management outcomes.

Many government agencies are applying ecosystem services concepts. The United States Department of Agriculture (USDA) has created an Office of Environmental Markets to enable continued growth of programs that subsidize the protection of valuable ecosystem services.² The USDA Forest Service is increasingly applying the concept to forest management,³ and the

United States Environmental Protection Agency has created a research program to document the status of ecosystem conditions related to important ecosystem services.⁴ In the conservation community, there has been a fundamental shift away from the traditional perspective of “keeping the people out” of nature to an appreciation of the dynamic relationship between nature, people, cultural values and economic drivers. This shift is centered on the concept of ecosystem services.

William D. Goran of the Construction Engineering Research Laboratory of the U.S. Army Engineer Research and Development Center and Elizabeth Keysar of Current Technologies Corporation furnished the foundation for the concepts presented in this bulletin.

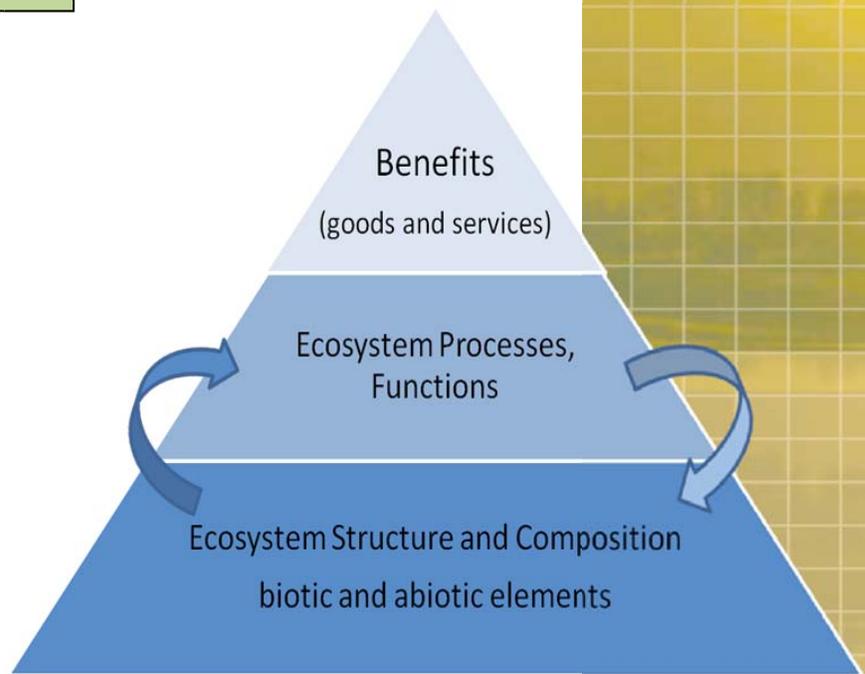


Figure 1. Ecosystem Structure and Function Underlie Provision of Benefits

References

- ¹Millennium Ecosystem Assessment: <http://www.maweb.org/en/index.aspx>; The Economics of Ecosystems and Biodiversity (TEEB) <http://www.teebweb.org/>
- ²Office of Environmental Markets: <http://www.fs.fed.us/ecosystemservices/OEM/index.shtml>
- ³Detailed listing of the resources developed by USDA Forest Service can be found at: <http://www.fs.fed.us/ecosystemservices/resources.shtml>
- ⁴<http://epa.gov/ord/esrp/>

MILITARY IMPLICATIONS

There are many services from ecosystems that benefit the military mission. Ecosystems supply land and habitats for realistic training, filter pollutants from stormwater, provide noise, safety and smoke buffers, and provide recreational opportunities for soldiers, their families, and community members. A high military operational tempo may increase soil loss, increase soil compaction and decrease species biodiversity through heavy and continual use of ranges and training areas, unless efforts are made to avoid, minimize and offset these impacts. New infrastructure for on-site generation of renewable energy will involve harvesting some services such as wind or solar energy, but also potentially impact other services, such as species habitat and soil permeability. Increasing population and land use changes threaten the buffering services from off-post ecosystems, and changing climatic conditions will alter system relationships across

ecosystems. External land use changes also reduce available habitat for endangered species, making the military biodiversity stewardship role even more critical. All these actions involve

ecosystem service tradeoffs – and using an ecosystem service framework can help the military better understand the costs and benefits of these tradeoffs.

Long-term sustainability of military training and testing requires protection of the ecosystem structure and function that underlies important services, but it is difficult to communicate these needs when other demands on land use have strong economic, regulatory and policy drivers. Although it is understood that there are limited natural resources to support ever-increasing mission requirements, there are few effective tools for reconciling conflicting demands and preparing for future demands.

The concept of ecosystem services can help the Army ensure the continued supply of ecosystem services that support the military mission. It provides a common language for communicating with other federal agencies, non-profits and academic institutions that are working in this field. It can help bridge diverse backgrounds and frames of reference within and outside the Army. The concept also has implications for strategic planning in support of contingency operations as the relationships between ecosystems, human health, and state fragility become more relevant to national security. The concept can be easily incorporated in existing regulatory compliance approaches, as off-site banks become more common for mitigation of impacts to the atmosphere, endangered species and wetlands. For these reasons, it is timely and appropriate for the Army to socialize the concept and incorporate it into the Army's lexicon for environment and sustainability.

ACCOUNTING AND MANAGEMENT TOOLS

The Army has multiple planning tools to track the status of ecosystems. On-post these include the Integrated Natural Resource Management Plan (INRMP) and the Range and Training Land Program. Off-post, the Compatible Use Buffer Program identifies parcels that have important attributes for buffering training and testing activities. These planning and management programs document the condition of ecosystems and track important metrics for meeting mission and natural resources management goals. The concept of ecosystem services and emerging quantification and valuation tools could help improve the implementation of these programs. The Natural Infrastructure component of the Installation Status Report system is designed to help capture and track the status of ecosystems, and ecosystem service concepts can help improve this system. National Environmental Policy Act (NEPA) assessments also present a framework for evaluating the impacts of proposed actions on ecosystem services.

"It is DoD policy that: ...All DoD natural resources conservation program activities shall work to guarantee DoD continued access to its land, air, and water resources for realistic military training and testing and to sustain the long-term ecological integrity of the resource base and the ecosystem services it provides..."
DoDI 4715.03 (March 18, 2011)

A No NET LOSS POLICY

Improved accounting and management systems must be guided by comprehensive goals and objectives, and sustainability planning has provided goals for many installations. The concept of ecosystem services can provide a common language for addressing impacts to ecosystems and linking this information to training, testing and other installation activities. An overarching policy should be considered – one that calls for no net loss of ecosystem services.

The undeveloped portion of an installation may contain training and maneuver areas, ranges, forested areas, wetlands, and preserved areas. When a decision to change land use in one of these areas is considered, such as the installation of solar photovoltaic array, the provision of certain ecosystem services (renewable power) will be

enhanced, while others decreased (maneuver area, habitat). The increase in one service may outweigh these losses, or the installation may enhance a degraded area to replace lost range capabilities. This approach seeks an overall no net loss of ecosystem services. It takes into account possible management actions and protects the overall “balance” of assets. It supports a more inclusive perspective of all values associated with particular land uses. Figure 2 diagrams how a no net loss policy could work.⁵ Through avoidance, minimization, offsets, enhancement, and preservation, installations can work towards an overall goal of no net loss to the ecosystem services that are critical to mission success over the long term. Implementation of the policy can include modifying project designs, altering land management actions, establishing conservation easements, participating in off-site mitigation banks, or engaging in ecosystem service markets.

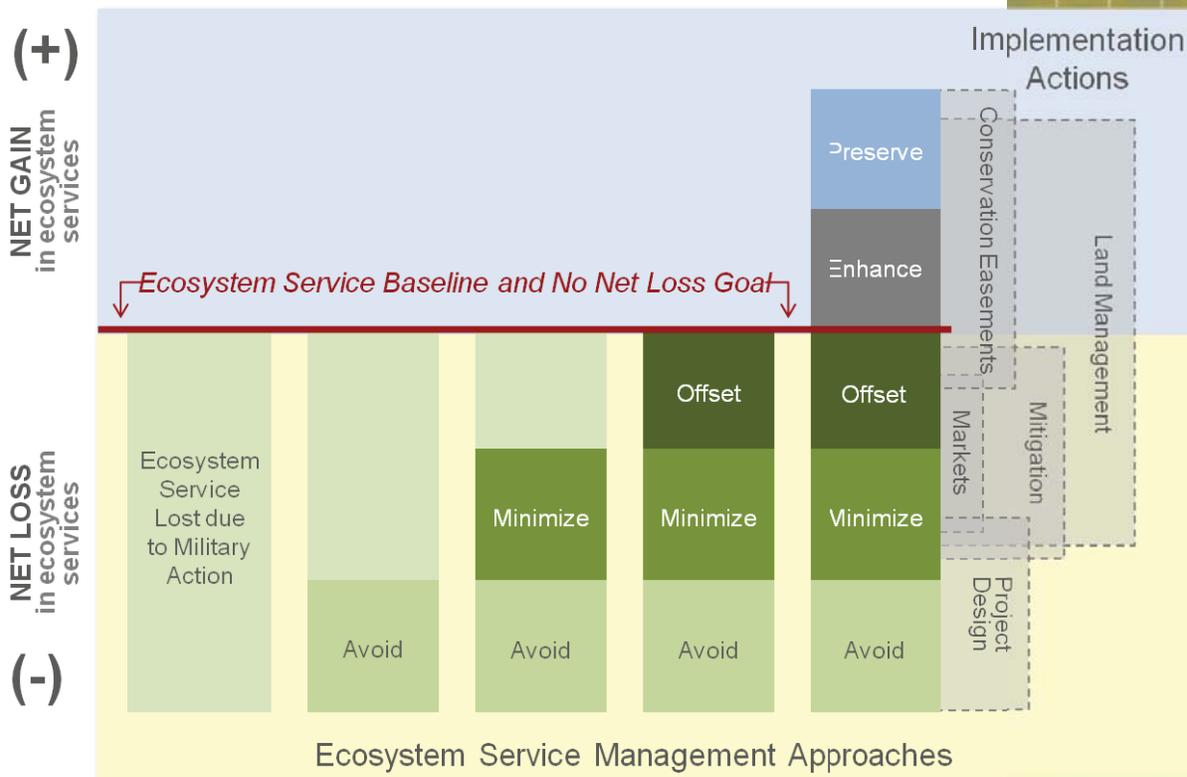


Figure 2. No Net loss of Ecosystem Services

References

⁵This figure is based on a biodiversity policy by Rio Tinto, a global mining company, and can be found at: <http://www.riotinto.com/documents/ReportsPublications/RTBiodiversitystrategyfinal.pdf>



"Each INRMP shall:
...Ensure no net loss to the training and testing capability and capacity of the installation and range and enhance those capabilities to the maximum extent practicable." DoDI 4715.03 (March 18, 2011)

"A Net Zero Installation applies an integrated approach to the management of energy, water, and waste to capture and commercialize the resource values and/or enhance the ecological productivity of land, water and air." (ASA IEE, 2011)

Additional research is needed to explore how the concept of ecosystem services can integrate existing policy, planning and management approaches at installations. A "No Net Loss" policy is consistent with existing regulatory approaches that call for a "no net loss" of wetlands and a net positive impact to endangered species. It is consistent with newly issued Department of Defense (DoD) natural resources conservation policy that calls for "no net loss" of training and testing capacity (DoDI 4714.03). It presents a tangible way to measure one aspect of sustainability of an installation over time.

A "no net loss" policy is compatible with emerging "Net Zero" concepts for energy, water and waste that are being developed by the Assistant Secretary for the Army for Installations, Energy and Environment (ASA IEE). According to recent guidance issued by the ASA IEE, Ms. Hammack, a Net Zero Installation as one which "applies an integrated approach to the management of energy, water, and waste to capture and commercialize the resource values and/or enhance the ecological productivity of land, water and air." The "Net Zero" policy

focuses on natural resource inputs of energy and water and reduction of waste generation. The No Net Loss concepts in Figure 2 for avoiding and minimizing are compatible with the Net Zero concept of reduction – trying to avoid the need to use energy or water through smarter designs and better management. Enhancing ecosystem service provision parallels the concepts of re-purposing, recycling, composting, and energy recovery. Ecological factors, or "resource values," need to be considered in the same light as energy, water and waste. The concept of ecosystem services enables those connections to be made. In order for an installation to truly be "Net Zero" it must also balance the impacts to ecosystems such that the flow of desired services is sustained over time. There are multiple ecosystem-related connections in the areas of energy, water and waste, thus these linkages are important to recognize for a complete "Net Zero Installation."

NEXT STEPS

In order to protect critical benefits Army installations received from ecosystems, the concept of ecosystem services should be adopted and applied. To enable this institutionalization, additional studies are needed to examine the impacts of a "no net loss" policy to existing management approaches. This could be done by: 1) considering "no net loss" actions along with "net zero" activities; 2) experimenting with a "no net loss" approach to a past or an upcoming NEPA action or easement evaluation to understand the challenges; 3) including ecosystem service considerations in revisions and updates to INRMPs and to applicable Army guidance. The Army should become actively engaged with other federal agencies and non-governmental organizations in order to advance in-step with these potential partners.

References

⁶<http://army-energy.hqda.pentagon.mil/netzero/>

Information presented in this Foresight Bulletin draws from the following:

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