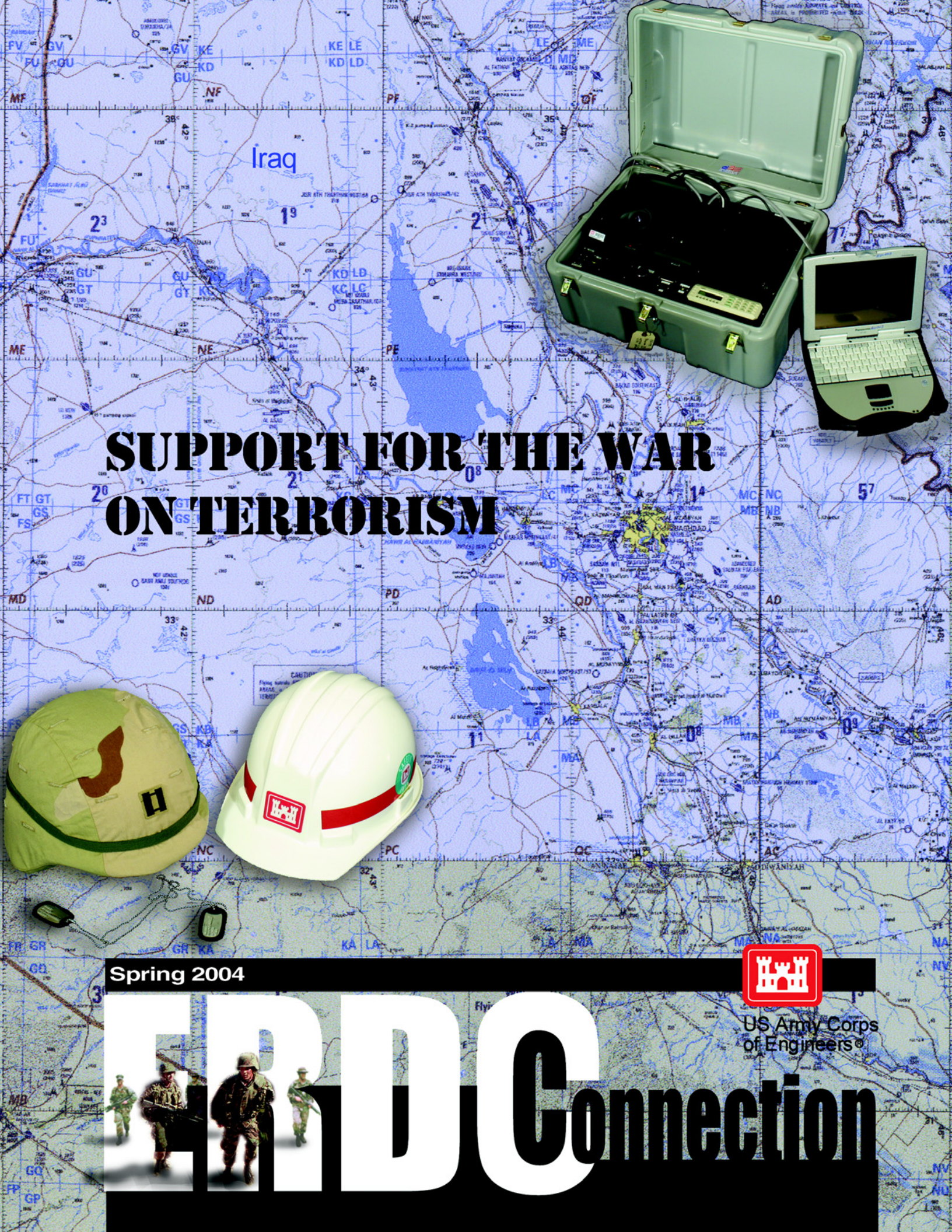

Iraq
SUPPORT FOR THE WAR ON TERRORISM
Spring 2004
ERDC Connection
US Army Corps of Engineers®

Director's Corner

The U.S. Army Engineer Research and Development Center (ERDC) is one of the most diverse research organizations in the world, combining all Corps of Engineers R&D operations into one organization that conducts research in both civil works and military projects.

ERDC engineers and scientists are essential to the success of our armed forces in the global war on terrorism. We also provide solutions to challenges with our nation's waterways and harbors, as well as environmental quality issues for military and civilian projects. ERDC has international capabilities; our expertise can help solve problems around the world, including construction, coastal engineering, installation support, water resources, environmental, and other related civilian projects.

The ERDC counts among its customers, partners, and stakeholders the Department of Defense; the Army, Marines, Navy, and Air Force; Corps districts and divisions; other federal agencies; academia; industry; and the American public.

In an effort to effectively communicate our mission, capabilities, and success stories to you – our customers, partners, stakeholders and the American public – we have initiated the publication you have before you, the *ERDC Connection.*

The *ERDC Connection* will be published quarterly and will be offered in two formats, electronic and hard copy. Each issue will highlight programs, projects, and success stories that fall under ERDC's primary mission areas of warfighter support, military installations, water resources, environment, and information technology.

In this, our first issue, you will read about ERDC support – past, present, and future - to the Global War on Terrorism and Homeland Security. You will also find articles on two programs that have been initiated to address, in a holistic manner, the needs of the Corps and the nation – the Environmental Modeling and System-wide Assessment Center and the Regional Sediment Management program. Those interested in sustainable military installations can read about a Web-based assessment tool that gauges an installation's future sustainability against encroachment risk factors.

This issue will also introduce you to ERDC's new commander, Col. James R. Rowan. Col. Rowan assumed command of the ERDC in July 2003, but immediately deployed to Iraq to handle engineer operations in Iraq. He will discuss his deployment and the job our engineer forces are doing in Iraq in these pages.

I hope you enjoy this first issue of the *ERDC Connection*. We look forward to your feedback and comments as we inform you, our customer, partner, stakeholder, and public, of the great things going on in the ERDC.

James R. Houston, PhD
Director

US Army Corps of Engineers
Engineer Research and Development Center

ERDC Connection

Director's Corner 2

Interview with Col. Rowan 4

ERDC contributions vital for the Global War on Terrorism and Homeland Security 9

New tool assesses regional encroachment risks 14

Regional Sediment Management gains momentum 16

Environmental Modeling and System-wide Assessment Center 18

Director - Dr. James R. Houston
Commander - Col. James R. Rowan

Chief, Public Affairs - Bobbie Galford
Editor - Debbie Quimby

The *ERDC Connection* is an unofficial publication of the U.S. Army Corps of Engineers and is authorized under the provisions of AR 25-30. The editorial views and opinions expressed are not necessarily those of the U.S. Army Corps of Engineers or the Department of the Army.

The *ERDC Connection* is published quarterly by the Public Affairs Office, U.S. Army Engineer Research and Development Center. Printed circulation is 1,000.

Articles, photographs, and other contributions are welcome. All submissions are subject to editing and rewriting prior to publication. Submission deadline is the 15th of the month prior to publication. Submissions, comments, and ideas for the *ERDC Connection* should be directed to: Editor, CEERD-PA-Z, 601-634-3188, or by email to *Deborah.H.Quimby@erdc.usace.army.mil*.

On the web at *http://www.erdc.usace.army.mil*.

On the Cover: The ERDC provided valuable engineering support during Operation Enduring Freedom and Operation Iraqi Freedom. The ERDC continues to provide support, both personnel and expertise, to reconstruction efforts in Afghanistan and Iraq.

Cover designed by Publishing and Technology Transfer Branch, Information Technology Laboratory.

Engineers in Iraq — Commander's perspective

Col. James R. Rowan assumed command of the U.S. Army Engineer Research and Development Center on July 26, 2003. He left Vicksburg on Aug. 3 for Baghdad, where he served as the deputy theater engineer and chief of staff for Brig. Gen. Larry Davis and Brig. Gen. Bo Temple, the theater engineers for the Combined Joint Task Force-7 (CJTF-7). Rowan returned to the ERDC on Feb. 7. We sat down with him upon his return to talk about his deployment.

EC: What were your duties as the deputy theater engineer and chief of staff?

Rowan: The C7 is responsible for all engineering work in Iraq. The key areas we worked on were U.S. facilities (base camps, airfields, hospitals, and prisons). Another branch handled captured enemy ammunition, a non-traditional engineer responsibility. We were responsible for consolidating, securing, and reissuing or destroying vast amounts of Iraqi ammunitions all over the country. Another branch handled Iraqi infrastructure – roads, bridges, and schools.

We had a special relationship with two key areas, oil and electricity. There were two Corps organizations with the day-to-day task of jump-starting oil production and restoring electricity, but we tracked those missions in the CJTF.

We eventually became very involved in tracking and looking at countermeasures for IEDs, or improvised explosive devices. One key branch was the Mine and Explosive Ordnance Information Coordination Center. They tracked these hazards across the entire country and shared this information with units.

> "The magnitude of the problem, the size of the country … and an unsecure environment made almost everything challenging."

EC: What were your first few days like?

Rowan: In the first couple of weeks, our focus was almost entirely on Iraqi electricity production at the national level. It was August, it was hot, and we were providing 12 hours of electricity each day. We worked closely with the Iraqi Ministry of Electricity, the Coalition Provisional Authority, USAID, and large international contractors to provide the best electrical service possible, given the outdated and poorly maintained Iraqi infrastructure.

EC: What was your typical day like at the CJTF?

Rowan: We started at 6:30 a.m. with a quick update from our Ops folks. At 7:00 a.m. we had a tactical update assessment briefing with Lt. Gen. Sanchez, and at 8:30, we had a C7 meeting to synchronize the day's activities.

The daily battle rhythm varied from day to day. I spent most days at Camp Victory on the west side of Baghdad. About two days a week, I'd get out to visit a unit, see a project, or go downtown for a meeting. I took every opportunity to get away from the office, where I had this desk with three computers on it – one unclassified, one U.S. secret account, and one coalition classified account. I spent a large portion of my time tracking information over three systems.

At 6:30 p.m., we'd have another update meeting with divisions across the country. At 8:00 p.m. we conducted the engineer worldwide VTC, through the TeleEngineering Operations Center (TEOC), to the engineer brigades, battalions, Kuwait, two or three districts in the states, and Afghanistan. We had about 30 stations on the VTC each night and I was in charge of running that – setting the agenda, calling on people, making sure the right follow-up questions were asked. By 9:00 p.m., we would wrap up the VTC and spend the last two hours cleaning up loose ends. By about 11:30 p.m., I could call it a day.

EC: What were the biggest challenges you faced while deployed?

Rowan: In everything we did, the numbers were so big. It's not hard to come up with housing for a single unit, but when there are 150,000 people spread out at more than 100 base camps, the magnitude of the entire theater makes everything hard. We knew what we had to do, but most of it was logistics and security, whether it was building base camps or trying to move 600,000 tons of ammunition. The magnitude of the problem, the size of the country, the logistics involved, all in an unsecure environment made almost everything challenging.

EC: What was it like to visit soldiers in the field?

Rowan: It was great to visit, but one thing holds true about Iraq – nothing is easy. Just to visit the 1st Armored Division a few miles down the road took major planning and execution. You had to coordinate the visit with them and line up vehicles — two, three, or four, depending on the area threat. Every vehicle required drivers and shooters, communications between vehicles and base camp, and safety gear.

Before leaving, you checked the routes for that day. Different routes were classified red, amber, or green and if there had been attacks or explosions, you had to be rerouted through another location. Then you gathered your convoy, loaded weapons, accounted for equipment, and got the right

paperwork to get out the gate. You carried a convoy report that indicated your route, who was in each vehicle, who would communicate, what actions you would take if attacked, and what hospitals you would go to if someone was injured. Your paperwork was checked at the gate and once outside, you were on an Iraqi road that, as time went by, had more and more traffic on it.

Driving around is one of the riskiest things you do over there because the bad guys have these improvised explosive devices (IEDs). They use IEDs to ambush U.S. convoys and kill as many people as they can. Sometimes they just try to blow up the vehicle. Sometimes they'll tie the explosion in with an ambush to further attack you once your vehicle is disabled.

EC: Were they using IEDs from the beginning?

Rowan: Yes, to some degree, but they're getting more and more sophisticated. In June, the IED threat was fairly low, maybe one or two a day. Starting in July or August, it continually ramped up and was on a steady increase until about the first of December. It reached its peak during Ramadan, the high holy time for Muslims. Since then, it has been steadily going down, for a number of reasons. We're getting better at detecting the IEDs, and the availability of munitions and funding to pay the people who are doing this is drying up.

The number of attacks is going down and the percentage of IEDs we detect and neutralize or blow up before they can attack us has gone up. However, those devices that do get detonated are more sophisticated, lethal and deadly. They're remotely controlled, or have collapsing circuits that target our EOD (Exploded Ordnance Demolition) technicians who are trying to disarm them. Those are the bravest guys in the country. They're overworked, and I don't know how much they get paid, but it's not what they're worth.

EC: Could you talk about the job done by the engineer soldiers in Iraq?

Rowan: What our soldiers did varied greatly, not only day to day, but by different parts of the country. Division commanders used their engineers in different ways. In some areas, combat heavy and construction engineers were put to work on base camps, improving the roads, building latrines, or improvising shower units. Other areas took their construction engineers and put them to work on humanitarian and civil affairs activities. In order to influence the part of Iraq they were in, they had to gain the consent of the Iraqi people for us to be there.

Once the war ended, combat engineers didn't have all the right equipment to handle construction, so commanders were using them – in the 4th Infantry Division for instance – in traditional infantry roles. They conducted daily raids, patrols, cordon and search operations, and set up flash checkpoints. Combat engineers were also very involved in the destruction of captured enemy ammunition. The long-term plan is to turn that job over to contractors, but for now, ammunition is spread out across the country. It's not always safe to move it, so engineers are spending a huge amount of time blowing it up and clearing out these areas.

Bridge units are engaged in repairing damaged bridges and conducting maintenance. Some are both military and civilian bridges that require traffic control and security.

All engineer units are engaged in force protection. Every base camp has wire perimeters, walls, access control points and gates, HESCO bastions and barriers throughout. We are responsible for much of that force protection work, either directly or by working with contractors.

Engineers are patrolling the river and picking up bad guys who use the river to carry out attacks against coalition forces. This is a non-standard use of bridge erection boats and operators, but the engineers worked with the maneuver forces and figured out successful tactics and procedures.

We have every type of engineer unit over there – firefighters, divers, topographers, well drillers, construction, bridge specialists, combat – and most of them are doing the missions their units are designed for. For example, if we're putting in a bridge, the divers go down and check for explosives and other hazards. They've also been engaged in the very tough mission of recovering bodies that have been lost through combat or accidents.

EC: How dangerous is it for Americans in Iraq?

Rowan: The danger is somewhat regional. Anytime you drive around, there is danger of some type of explosion. We've minimized that risk by route reconnaissance, by training people how to recognize these things, and by

providing more up-armored vehicles. While in camp, we would occasionally be fired on by incoming mortar rounds, usually at night. They weren't accurate, just firing into the center of the camp, hoping to get lucky. They would stop their vehicle, shoot into camp, then get out of there before we returned fire or dispatched a patrol.

EC: What were your impressions of your fellow soldiers, active and reserve? Did you see any differences between the two?

Rowan: The engineer regiment is about 75 percent Reserve Component. The Reserve has some training challenges, but as far as engineering missions, they tend to be at least as good as the active components. What they lose in training time they make up for by being in a unit longer, and are older and wiser, with civilian jobs, especially in the engineering field. Everyone cooperates and gets along very well. There is no "us versus them" mentality.

EC: How is soldiers' morale?

Rowan: Morale is very high. It's a long deployment – 365 days on the ground. If you're in a Reserve unit, the mobilization piece at the front and the demobilization piece at the end don't count. So, many of the Reserve units are there for 15 months or so. In spite of that, morale is very high. The average soldier can call home every seven to ten days and most have access to the Internet. Morale is pretty good – as good as it can be for a lengthy deployment in a dangerous place.

EC: What changes or improvements did you see over the course of your deployment?

Rowan: A lot. By this spring, all of our soldiers are living in some adequate facility. Even if it's tented, it will be air-conditioned and heated and will have a certain amount of protection against mortar rounds. We spent a ton of time, money and effort building up our base camps and that's one huge improvement. As for sanitation, our soldiers no longer have to burn human waste every day, which is about the nastiest thing you can image! Another huge improvement!

The Iraqi oil infrastructure has improved daily through the efforts of Task Force RIO (Restore Iraqi Oil). We now produce about 2.5 million barrels a day and export about 1.5 million barrels a day, providing much needed money to the country. We've also increased imports of refined products like benzene, kerosene, and LPG (liquefied petroleum gas) for cooking. We're meeting the Iraqi people's demands for petroleum products to improve their lives.

The Iraqi electricity situation has improved greatly. There is more power, more stability, and the Corps has finished distribution lines and put in several hundred megawatts of new generation.

As for captured enemy ammunition, the sites have now been collapsed and secured, and there is much less available ammunition for the bad guys to steal and use against coalition forces.

Things are improving daily in almost every area. There are still attacks, there are still bad guys, and it's still a dangerous place, but the attacks are on a decline and it's safer now.

EC: These improvements must contribute to improving the morale of the Iraqi people. Did you see this?

Rowan: Morale is pretty good. The Iraqi people want what we all want – a safe place to live, food, basic services, schools for their children, and the ability to drive around safely. The major complaint from Iraqi citizens is the security situation. Most of the tips we get to catch the bad guys are based on human intelligence from the local population. Most of them want to clean the country up. It's a very small number of Iraqis and foreigners who want to destabilize the country.

Col. James Rowan poses with British officer in front of captured enemy ammunition (U.S. Army photo)

EC: Do you think the media coverage of events in Iraq has been accurate?

Rowan: What you see in the media is true. They're not telling lies about what's happening over there. Deaths, bombs, destruction – these things are taking place. But there's more good news stuff that's not getting the same degree of publicity – individual soldiers doing heroic things, people

making sacrifices, schools opening up, businesses starting, Iraqi police coming back on line. Iraqi civil defense and military under our leadership are taking over some of the security stuff; the oil industry is coming back on line at a rate faster than the bad guys can sabotage it – so if you read or watch just the media, you probably won't see all the good stuff that's going on.

EC: From a soldier's perspective, how important is the Global War on Terrorism?

Rowan: It's absolutely critical. In our mind, with the Global War on Terrorism, we are directly defending the United States. We were attacked and we're fighting back. That's what the military does. Everybody understands that and the people who are there for the longest time, and will be back there again, are the first to say, "Yeah, it's a hard mission, but we've got to do it. That's what we get paid for."

Col. Rowan takes a ride by chopper in Iraq (U.S. Army photo)

EC: How important is ERDC military research to the soldier on the ground?

Rowan: The soldiers in the field are the executors. Many times they don't have the time, expertise, or resources to do the job. We were reaching back to the Corps and the ERDC on a daily basis. When we wanted to build a building, we didn't have the time or the right team to do a design, so we'd send back what we needed and they (through the TEOC) would send a design back to us.

Military manuals can classify a bridge, but there are many safety factors built in. If you have a structural engineer, you can get a much more detailed and accurate assessment of the bridge. There are a lot more bridges than there are structural engineers (in Iraq). We identified the key bridges and tele-engineered video or still photos back to Vicksburg, and got a solution in a very quick turnaround.

The communications we have going back here to the TEOC were absolutely critical to us. Not many people know it, but the distance from the port in Kuwait to our northern base camps in Mosul is farther than the distance from Normandy to Berlin. When we start talking about communications and moving supplies and information back and forth – and we were working over every inch of that line – having long-haul communications on a daily or more frequent basis back to the ERDC was one of our real successes.

EC: How long do you think we'll have a military presence in Iraq?

Rowan: Many years. I'm not going to be more specific than that, but it's going to be a multi-year investment. The military presence will decrease in number, but I think we're in there for the long haul. If we were to leave too early, it would all be for naught. The reason we're there is because we're part of the Global War on Terrorism and we're not going to wait and be reactive to the next attack on the United States. We're going to take the initiative. It's an offensive operation.

EC: What can we expect in the future in Iraq?

Rowan: I think we'll see some major changes. On June 30, Iraq becomes a sovereign governed nation, an expanded version of the current Iraqi Governing Council. We'll see a huge U.S. embassy presence there and the military will stay there to assist with the security mission. I think we'll begin to disengage and pull out of some of the major towns, and transition to where the first line of defense will be Iraqi police, civil defense, and military. Coalition forces will be a backstop measure to pick up the things that overwhelm local forces. I think it will continue to be a contentious place in the world because the people who want to see us fail are not going to give up easily. They will continue to send in freedom fighters or terrorists or well-funded Al Qaeda or other people, so it's going to be a tough fight for a number of years.

EC: What was your most memorable moment?

Rowan: The ones that really stick out in my mind are the memorial services. The number of soldiers we're losing is not a militarily significant number that affects our ability to do the mission, but each one is so personal and so tragic. You go to these memorial services and each one is very memorable and very moving.

EC: What did you take away from this deployment?

Rowan: Every time you do this, you're a better officer when you leave just by the experience you gain, working with other units, coalition partners, working under a new mission, a new set of terrain, and new enemy experience. It was a rewarding experience, but I'm also glad to be home.

ERDC CONTRIBUTIONS VITA

L FOR THE GLOBAL WAR ON TERRORISM AND HOMELAND SECURITY

by Wayne Stroupe with contributions by Jackie Bryant and Marie Darling, ERDC Public Affairs Office, and Billy Bridges, GSL contractor

He is providing terrain analysis tools to help our soldiers detect Improvised Explosive Devices, or IEDs as they are called, as our troops patrol the mean streets in Iraq.

She is working in the TeleEngineering Operations Center, helping provide answers to problems our soldiers are facing in Afghanistan.

Badly shaken by the terrorist mortar attack on his Iraqi position, the soldier is never the less happy that they decided to use the new protective design the engineers back in the states recommended – it made the difference!

Although burned during the attack on the Pentagon on 9-11, the security manager is alive today thanks in part to new protective building components that had been installed just weeks before.

She is in Baghdad, using a geographic information system to produce critical, up-to-date maps for our troops and engineers. He is in Kabul helping rebuild roads to get this war-ravaged country moving economically forward.

What do these people have in common? They are real. They are soldiers – some real and some "drafted" – in our nation's war on terrorism. And they are part of the important contributions the U.S. Army Engineer Research and Development Center (ERDC) is providing for our nation's homeland security and in the Global War on Terrorism.

Some are researchers here at home, working long hours to support our forces in the field; some are unwilling but happy customers that owe their lives to ERDC products and technologies; and some are deployed ERDC civilians in harm's way in Iraq and Afghanistan.

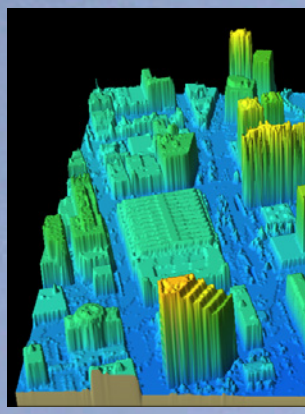
ERDC research, ERDC products and technologies, and most importantly, ERDC personnel, are making vital contributions in the Global War on Terrorism and are making important impacts in Homeland Security.

KNOW THE TERRAIN

To successfully plan and conduct operations in Iraq and Afghanistan, our military needed to know as much about the terrain as possible. New terrain products and technologies were instrumental in successful operations. ERDC supplied critical terrain products and services, including Urban Tactical Planners that individually portrayed all major and strategic Iraqi cities: drainage studies (important aspects of route reconnaissance) for seven tactical routes to Baghdad; terrain analysis support for over 600 weapons of mass destruction and sensitive sites; engineering route studies for various Middle East countries, providing graphics that portray major surface transportation systems, terrain and climatic conditions; the Water Resource Data Base and detailed hydrologic information for mission planning and water supply requirements; imagery derived products that depict change detection over selected cities; and quick responses to the numerous daily requests for information on topics ranging from drop zones, to water resources, to soldier bed-down locations.

To enhance such operations in the future, on Jan. 30, ERDC and the commanding general of the Army Intelligence and Security Command (INSCOM), signed a Memorandum of Understanding to continue joint support of Army operations in the Global War on Terrorism and to develop an Information Dominance Center in the Washington, D.C., vicinity. ERDC and INSCOM have cooperated for the past year to fuse geospatial information and all-source intelligence to support the Army's Global War on Terrorism requirements. ERDC is also creating a Joint Terrain and Weather Effects Intelligence Center that will provide integrated geospatial and weather data and operate as an around-the-clock support center.

To address current life-and-death concerns in Iraq, ERDC recently field-tested a system to locate IEDs, the Improvised Explosive Devices being used to attack our troops. The system used commercial-off-the-shelf hardware coupled with ERDC-developed analysis tools to collect and analyze data along a simulated convoy route. The system successfully identified simulated IEDs. ERDC is also examining innovative sensor packages to detect placement of IEDs and advanced lightweight materials that could be placed around IEDs.



ERDC terrain products ar
the war on terrorism and
agencies for Homeland S

"MR. FORCE PROTECTION"

Dr. Reed Mosher

His official job titles include technical director for Survivability and Protective Structures, head of the ERDC task force for Homeland Security, and lead technical director for military engineering. In simple terms, Dr. Reed Mosher is "the man" in ERDC for much of the research being used by our troops in the field and by Homeland Security organizations here at home.

Mosher shrugs off the titles. "Force protection is no one person's responsibility; it's a team effort. There is no one single force protection 'Bubba' in the Army. We (ERDC) want to be part of the solution, and we've gotten nothing but great responses on our research products.

"Our ERDC research for homeland security is largely based on work we did for military projects, such as weapons effects and military installations. We are piggybacking existing capabilities and expertise. We don't have to reinvent or retrain people; we just redirect them.

"One area, vulnerability research on civil works infrastructure for Corps dams, locks and other structures, is building directly on military research. While these are special structures, our knowledge base started us way out ahead in these areas.

"Bridge vulnerability is another one. We can do this because of our research background in military weapons and how to destroy bridges and other structures. We have experts who tell us how to attack a bridge. Now we are working on how to protect U.S. bridges. I don't know any other place that could do this," Mosher said.

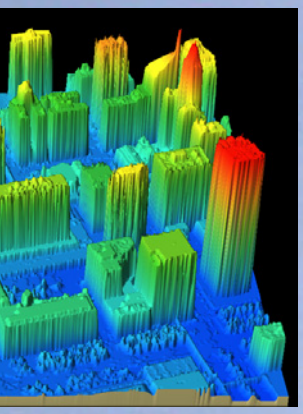
Other ERDC technologies, developed and honed for use with military or civilian projects, have linked applications in Homeland Security issues.

"We have water modeling expertise, such as the Chesapeake Bay high performance computing model. If terrorists put toxic chemicals in a river, we can use these models to predict the impact, alert people, and do a time line for contamination and concentration.

"What if terrorists created a chemical spill on land? We have developed cleanup and modeling technologies for use on military installations. We just move it on out to civilian areas. Our work on HVAC (heating, ventilation, and air conditioning) systems for military installations is helping us with modeling capabilities for chemical, biological or radiological attacks. How does it enter a building? How does it flow? How do sensors detect it? And what systems are needed to clean up? A lot of existing ERDC technologies have application in Homeland Security," Mosher said.

Previous ERDC research on how to destroy bridges is used as the basis for research on how to protect bridges and other structures (ERDC photo)

Mosher believes ERDC will be working hand-in-hand with Homeland Security in the future. "I see us providing more support to the Department of Homeland Security, maybe through component organizations like the Transportation Security Administration and the Coast Guard. ERDC is also influencing the national plan for research and development for critical infrastructure protection. We are working with Homeland Security to develop this plan."



e used by warfighters in
by security and planning
ecurity (ERDC photo)

ERDC has long been a research leader in weapons effects, protective structures, and survivability. Over the years, this research led to protective building designs, retrofits to improve protection in existing buildings, and tools to help do vulnerability assessments. These protective technologies have been used in many government buildings in the last several years and continue to be used today.

These protective designs and structural components went through a variety of explosives tests and computer modeling over the years, but the biggest test occurred on Sep. 11, 2001. When the hijacked plane crashed into the Pentagon, it obliterated the first and second floors. But the plane impacted the first wedge of the Pentagon that had just been renovated using a variety of ERDC-developed protective technologies on the walls and windows. Unprotected offices 90 meters from impact were wrecked, while renovated Pentagon offices only 17 meters from the plane's impact were relatively intact. These protective technologies were credited with saving numerous lives at the Pentagon.

Although severely burned in the attack, civilian security manager John Yates offered the following during a television news show on the Pentagon, "It's a testament to the work the people in the renovation did and to the engineers. If it hadn't been done, if there had been no structural hardening, I can't imagine what the death and destruction would be. It would have been more catastrophic than what it is, 10 times, a 100 times worse...I don't ask why any more, I just say thank you."

New ERDC protective technologies are being installed in the continuing Pentagon renovation. They are also being used in numerous other military and government buildings. But ERDC research in the last year or so has been moving in another direction.

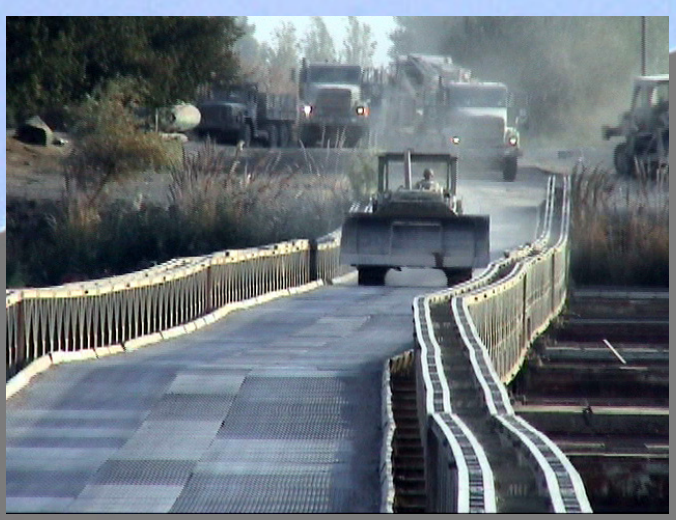
"Since 9-11, our research funding has fallen off in building studies," Mosher said. "The emphasis today is on the warfighter. Funding for building studies is being diluted to address other things, like the chemical/biological threat. Chem/bio scares people, and there really is a void there. Where we are in building protection is way ahead of chem/bio.

"We needed to focus on warfighter support. Army Transformation started this move, and current military operations have reinforced the need for this research," Mosher said.

The Base Camp Protection and Survivability Program is an example of this type of fast track, important research. Base camps usually involve lightweight structures (tents, shipping containers, trailers, etc.) in hostile territory – in this case Iraq and Afghanistan.

"We have people this weekend working at the Joint Readiness Training Center at Fort Polk (La.) to provide overhead cover protection for trailers that are being widely used in Iraq to house our soldiers," Mosher said.

Results from live-fire tests of mortar rounds on Friday at Fort Polk are in Iraq on Monday via TeleEngineering. Not only do the tests improve design concepts, they also provide real demonstrations and aid in training for the warfighters at Fort Polk who will soon rotate into Iraq.



Tele-Engineering kits in the field help our soldiers get quick answers to field problems... like what loads can a repaired bridge safely handle (U.S. Army photo)

"TeleEngineering is a major piece in getting ERDC technology to the warfighter," Mosher said. "A lot of the things we do would not get to the warfighter if not for TeleEngineering."

TeleEngineering uses small, suitcase-size deployable kits that include all the equipment needed for secure two-way video and voice communication between ERDC and soldiers in the field. If our troops run into engineering problems, they can use TeleEngineering to access experts in the United States for quick answers. Approximately 100 kits are deployed now, and ERDC has received almost 2,500 requests for assistance from soldiers in Iraq and Afghanistan.

"No one else but ERDC could provide the technology transfer to the user - the warfighter - in such a short time," Mosher said.

Another major ERDC resource for military planners is the Joint Antiterrorism Planning Guide (JAT Guide). The Web portal-enabled JAT Guide provides the requirements, processes, tools, and templates to produce a comprehensive and effective antiterrorism plan for an entire military installation of any size. The system also has potential for use by cities, states, and other government agencies. It has been field tested at Army, Marine Corps, Navy, and Air Force installations.

The JAT Guide contains invaluable planning tools that allow planners to evaluate terrorist threat scenarios, tactics, weapons systems, security upgrades, building retrofits, explosive standoff distances, and potential bomb damage, and even possible threats for incoming or departing aircraft. It is one of the many ERDC tools developed for the military that should also see widespread use in future Homeland Security applications.

To maximize the use of these rapidly developing critical protective and antiterrorism technologies, ERDC personnel take every available opportunity to brief senior Department of Defense military officers and civilians. They also provide training on current ERDC protective designs to warfighters and Corps employees deploying overseas. Interest in this research is very high, and feedback has been extremely positive. Military officers returning from Iraq have confirmed that ERDC protective positions are being used by our troops and that the positions **have saved lives**.

Mosher credits the ERDC staff for their capabilities and diligent work. "We have very good folks marketing, doing the work, and getting our products out there. Our people are stepping up, doing the job, taking responsibility, and having fun. And they are bringing the new people along, too."

ERDC'S REAL "FIELD TESTER"

Col. Eddie Chesnut, director of ERDC's Joint Antiterrorism Program, is a reserve officer on active duty in Iraq with the 420th Engineer Brigade. As the deputy brigade commander, he handles the command's day-to-day operations and works closely with the Corps' new Gulf Region Division. Chesnut agreed that if ERDC provided technology, he would get it in the hands of soldiers to see if it worked. Following are his quotes on ERDC support.

"Everyone is excited and eager to use and validate ERDC technologies in the field. So far, the results have been taken very seriously and are going to be a great help in making decisions based on scientific data rather than emotional responses. This is a great place to do technology transfer, and we are moving out as fast as possible to put the right tools in soldier's hands to enhance their ability to support the mission.

Col. Eddie Chesnut

"We placed an Automated Route Reconnaissance Kit from ERDC's TeleEngineering Operations Center on one of the 555 Topo Company's vehicles and are planning to initiate deliberate route reconnaissance this week.

"We just got back from the Baghdad Correctional Confinement Facility, where we have been working with ERDC and the Corps' Protective Design Center (in the Omaha District) to develop overhead cover solutions to mitigate the effects of mortars that have been killing soldiers there. We have briefed the Combined Joint Task Force-7 engineer on overhead cover solutions for theater standards for our containerized living areas. The brigade's 21T survey team soldiers and the 21B planning staff are running AT Planner (an Antiterrorism Planning tool developed at ERDC) to validate design against known IEDs and mortar threats prior to our commitment to construct.

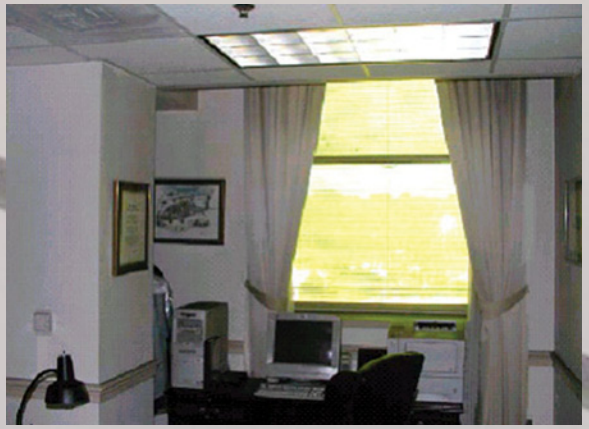
"We used TCMS 2.0 (Theater Construction Management System) software to do take-offs on a large group of planned facilities and validated planning options for over $100 million worth of potential construction.

"I plan to recommend a couple of ERDC's survivability shelters for fuel trucks and overhead protection from mortars at Baghdad Correctional Confinement Facility. They are attempting to try some other designs there, and it appears that ERDC's design is just what they need.

"Finally, we greatly increase our effectiveness through the use of the TeleEngineering Tool Kit to coordinate engineer efforts on everything from maintenance coordination and updates to construction planning and operational updates. We are scattered out in an area about half the size of California, but we use TeleEngineering to coordinate face-to-face three days a week to work issues and plan events.

"I hope this gives you an idea of what we are doing here with the assistance of the great tools and people from ERDC."

Typical third floor view of Pentagon without retrofit, 90 m north of impact site (DoD photo)



Typical third floor view of Pentagon office with retrofit, 17 m north of impact site

"OVER THERE"

ERDC personnel have always been some of the first Corps personnel to go to the field for emergency operations – hurricanes, floods, earthquakes, even terrorist bombing attacks on buildings. But this one is a little different; this one is a little dangerous.

Currently, eight ERDC team members have deployed and returned home safely (including ERDC Commander Col. James Rowan – see related story in this issue). Seventeen are currently deployed, including an ERDC laboratory director working for the U.S. Ambassador to Iraq, Paul Bremer. Other ERDC personnel have volunteered for deployment and are standing by.

Some are on the ground providing specialized engineering expertise, such as updating maps for military operations. Others are helping rebuild Iraq and Afghanistan infrastructure – schools, roads, airfields, and fuel distribution systems. ERDC personnel are also handling administrative and logistical duties to ensure our deployed soldiers and civilians have the equipment and necessary tools to do their jobs.

Michael Bishop, ERDC, discusses work with an Iraqi worker at an oil facility in Southern Iraq

Other ERDC team members were activated by various Army reserve units and went overseas to a variety of locations for multiple duties supporting our military forces buildup and ultimate operations in Afghanistan and Iraq. A great linking publication is the ERDC "Heroes" bulletin that was published in December 2003. You can access it by going to *www.erdc.usace.army.mil*, going to the news release link, and clicking on "ERDC Special Heroes Bulletin" under the "People in the News" section.

New tool assesses regional encroachment risks

by Dana Finney, ERDC Public Affairs Office

A Web-based tool being developed at ERDC draws on national databases to gauge a military installation's future sustainability in light of encroachment risk factors.

Called "Sustainable Installations Regional Resource Assessment" (SIRRA), it gives planners information to help in making decisions that will avoid or limit constraints to Department of Defense (DoD) activities.

In simple terms, DoD considers encroachment to be any outside activity, law, or pressure that affects the ability of military forces to train to doctrinal standards or to perform the mission assigned to the installation.

It occurs over time with changes in the surrounding community — urban growth and development, and competition for resources such as airspace, energy, water, frequency bandwidth, and others. More encroachment factors come in the form of environmental laws with which the installation must comply.

One example is the Endangered Species Act, which requires protection of both the listed species and their designated Critical Habitat. Almost every U.S. installation is home to threatened and endangered species (TES). This is the result of DoD's having maintained vast acreages of unspoiled habitat, while outside the fence, urbanization has all but wiped out these ecologically sensitive areas.

At Fort Huachuca, Ariz., one such species is the lesser long-nose bat. "It feeds on the nectar of flowering plants that grow on our ranges, so that means some seasonal readjustments to our training," said Sheridan Stone, biologist in Fort Huachuca's Environmental and Natural Resources Division. "While most of our other TES are peripheral to the training areas, we have to also consider the indirect effects they bring as we manage land to protect them – like ground water pumping to meet our human and mission needs, controlled burns, and other wildland fuel reduction efforts – which eat into our budgets."

Encroachment represents a major challenge to DoD. Installations exist to provide soldiers with tough, realistic, battle-focused training. Any compromise due to encroachment issues could impact readiness and place not only our soldiers at risk, but the nation's security as well. In addition to meeting today's training needs, installations must be able to sustain this capability in the future.

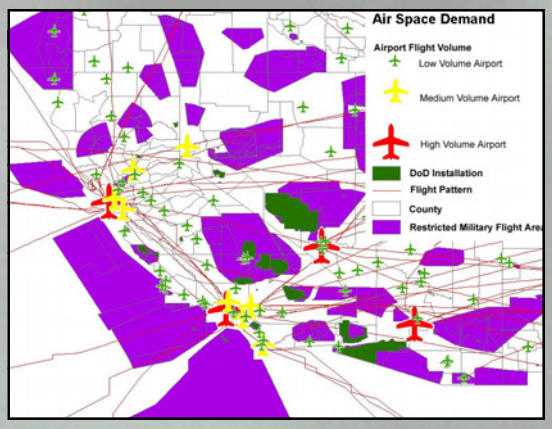
SIRRA assesses an installation's regional sustainability based on 10 sustainability issues: air, energy, urban development, TES, locational issues (e.g., seismicity), water, economics, quality of life, infrastructure, and security. These conditions are analyzed through geographic information system maps produced from nationally maintained databases owned by agencies such as the Census Bureau, Geological Survey, Environmental Protection Agency, Federal Aviation Administration, and others. It can show results either on a national or regional basis, allowing installation, local, and regional planners to collaborate on decisions with long-term benefits. This kind of cooperative dialog is critical to heading off future encroachment problems.

Each of the 10 sustainability issues includes indicators that contribute to the risk. For example, "Quality of Life" weighs elements such as crime rate, housing, healthcare, educational opportunities, and commuting times. "Air Sustainability" assesses risk due to noise complaints and non-compliance with Environmental Protection Agency criteria for pollutants.

"SIRRA includes a lot of features that are very good from a 'big picture' sustainability standpoint," said Lynn Engelman, Air Installation Compatible Use Zones (AICUZ) Program Manager for the U.S. Air Force. "We need to help decision-makers develop the vision to understand how this information can be used in planning – and then to use a comprehensive planning approach to look at all of the factors involved with training and their relationships to other realities that must be considered."

Engelman notes that Air Force training activities, which are not land-use intensive like the Army's, have fewer encroachment problems. The two major issues are aircraft noise and airspace competition. A long-established, proactive AICUZ program, combined with initiatives like the DoD Office of Economic Adjustment's Joint Land Use Program, has helped local communities incorporate land use compatibility considerations related to aircraft noise and safety issues in their land use planning around installations. However, the Air Force is closely monitor-

ing its situation because "there are changing conditions across the country and some have the potential to cause real problems in the future if we aren't prepared to deal with them."



SIRRA includes a feature that allows planners to list results using "red/amber/green" to show "high/medium/low" sustainability risk. The analysis uses validated scientific methods and data coupled with expert opinion. As with any model that seeks to integrate complex environmental, social, and economic variables, it has limitations depending on how it is used. SIRRA alone does not provide leadership with a "go/no-go" answer, yet contributes a very important element as DoD integrates all factors comprising and predicting installation sustainability.

"SIRRA has the potential to be a key tool in ensuring the long-term sustainability of our military lands," said L. Peter Boice, Conservation Team Leader at the Deputy Undersecretary of Defense for Installations and Environment. "It can help our decision-makers look at our installations in a regional context, identify potential constraints and stressors to future operations, and develop solutions while there is still time to act."

Fort Huachuca, other Federal and State agencies, and surrounding communities have formed a dynamic coalition to address encroachment. Their collaboration has met with such success that it is widely viewed as a model for all DoD installations. Huachuca's Stone reveals that the secret is in gathering all the information available through scientific research and consulting with the stakeholders – then participating in the process with an open mind and a commitment to seeing past the "here and now."

A case in point is the Arizona region's water supply. "The fundamental point that's easy to lose sight of is that it's not about *quantity* … whether we'll use it up, as you would believe," Stone said. "It's in *how* we use what's available today and the impact those decisions will have on the ecosystem. It's really an issue of scale for each individual – what is your sense of place and community? [Is it more important] to have the swimming pool in your backyard or to ensure that the value of this place continues for a broader range of society's needs?"

The initial efforts in collaboration among Fort Huachuca and its regional partners came after concerns about environmental litigation and the post being closed under an earlier Base Realignment and Closure (BRAC) round. Ironically, the same fears led to developers' embarking on a nationwide marketing plan to entice non-military residents to the area. It worked, and now Huachuca has another growing encroachment problem as new housing developments spring up closer and closer to the fence.

SIRRA is being developed in conjunction with ERDC's Fort Future program. Tools emerging under Fort Future comprise a "system of systems" that unites existing and new computer models to form a virtual installation. Building on currently available and planned Standard Army Management Information Systems (STAMIS) that provide a snapshot of the present, Fort Future uses modeling and simulation to help decision-makers explore potential consequences of their decisions. SIRRA is part of the ERDC's Sustainability, Encroachment, and Room to Maneuver (SERM) program.

Currently SIRRA is producing regional sustainability assessments for over 200 DoD installations in the continental United States. It is also supporting the Army BRAC office in initial information-gathering phases for BRAC 2005. Other efforts in SIRRA's development are in cooperation with the Army Environmental Command and the Center for Army Analysis. The tool is being funded in part under the Strategic Environmental Research and Development Program.

Because the SIRRA tool relies on national databases, and the geographic information system maps produced are non-military, it can support any type of land-use planning activity in analyzing sustainability. In addition to installation sustainability planning, it can augment regional planning, stationing changes, force transformation, and BRAC decisions.

An ERDC Technical Note for SIRRA is available on the SERM website, *http://www.cecer.rmy.mil/KD/serm*, or for more information, please contact Elisabeth Jenicek at 217-373-7238, *Elisabeth.M.Jenicek@erdc.usace.army.mil*.

Regional Sediment Management gains momentum

by Elke Briuer, ERDC Information Technology Laboratory

America's coastal waters support millions of jobs and generate billions of dollars in goods and services each year. The coastal recreation and tourism industry is the second largest employer in the nation, serving millions of visitors every year. Commercial fish and shellfish industries, as well as recreational fishing, contribute billions of dollars to the economy annually.

The U.S. Army Corps of Engineers is responsible for maintaining the nation's channels, harbors and waterways, and strives to do so in an environmentally and economically feasible manner. Unfortunately, excessive sediment transport, erosion and deposition in inland and coastal areas across North America cause billions of dollars in damages each year. The United States spends about $700 million annually on dredging alone.

Thirty coastal states have some type of erosion problem, created by both natural and human causes. Wind, waves and tides create and destroy beaches. Structures like breakwaters or jetties that calm waters in and around harbors, as well as locks and dams that store water, control flooding and allow navigation may trap sand that would normally be deposited on a beach. Inland, excessive sediment transport can clog waterways, causing flooding and slowing commercial navigation.

The Corps is turning to regional sediment management as a means to more effectively balance the scales between the demands of a growing society and the importance of protecting and enhancing the environment.

Regional Sediment Management (RSM) is an approach to managing sediment as a resource in the nation's river and coastal systems and estuaries. Although the term "regional sediment management" is relatively new, the regional nature of sediment transport processes and the regional influence of engineering works have long been

RSM affects regions from the mountains to the sea (ERDC graphic)

recognized. What is also new today is the Corps' collaboration with local and state governments to manage sediments over regions that encompass multiple projects. The regional sediment management approach has generated synergistic exchanges between Corps staff; state representatives; conservationists; harbor, coastal and port stakeholders; and even the general public.

Jack Davis, RSM program manager, and Barry Holliday, chief of navigation, Corps headquarters.

Corps division and district personnel as well as researchers from the U.S. Army Engineer Research and Development Center (ERDC) have demonstrated the benefits of RSM throughout the country. New business processes within the Corps have expanded the scope of managing sediment on a regional basis. Regional and national stakeholders, other interested individuals from outside the Corps, and international audiences at professional meetings understand the concept's benefits. Indeed, there is a movement internationally to manage sediment from a regional perspective, as evidenced by recent conference and workshop themes worldwide.

"Regional sediment management is an approach that seeks balanced, sustainable solutions for challenges presented by sediment," said Dr. Jack Davis, RSM research program manager at ERDC. "The goal is to make sediment management decisions by considering the economic and environmental consequences of those actions across a watershed or a region."

With the cooperation of all parties working in an area as regional management strategies are developed, savings through collaborative funding and resource sharing will make a positive difference. "The RSM approach neatly dovetails into another Corps objective, namely to implement our Environmental Operating Principles into every project we undertake," Davis said.

While the research program is developing new RSM technologies for Corps-wide implementation, the National RSM Demonstration Program, managed at ERDC, is assisting with infusing the RSM approach into various Corps projects with positive results. Julie Rosati manages the Corps' demonstration program. "Interest in regionally managed sediment projects has been growing, and participation has increased tremendously among Corps divisions and districts," Rosati said.

"Through the demos and our reporting, presenting and placing information online, we have been able to reach out to all of our constituents. We really have made information transfer one of our priorities, and together with the Corps' Institute for Water Resources, we're able to show important references useful to the people in the field," Rosati said.

Regional workshop slide presentations are available online and the Corps' Mobile District has documented "how to" and "lessons learned" from its RSM demonstration projects (see sidebar for helpful links to various Web reference sites). In addition, an *RSM Primer* is under production and will be placed online in the spring of 2004.

As the Corps seeks shared business solutions and tools through up-to-date technology, it is clear that a regional approach to sediment management will be of value to the nation, not only through cost savings, but also through a better understanding of the systems' dynamics with resulting positive ecological impacts.

RSM website: *http://www.wes.army.mil/rsm/*
National RSM Demonstration Program: *http://www.wes.army.mil/rsm/RSM-NDP/demos.html*
RSM List Server sign-up: *http://www.wes.army.mil/rsm/pubs/listserv.html*
RSM News and Calendar: *http://www.wes.army.mil/rsm/news/news.html*
Mobile District's Northern Gulf of Mexico RSM Demonstration: *http://gis.sam.usace.army.mil/Projects/RSM/*

EMSAC

Environmental Modeling and System-wide Assessment Center

by Sara Leach, ERDC Public Affairs Office

The Engineer Research and Development Center's (ERDC) Environmental Modeling and System-wide Assessment Center (EMSAC) became a reality last year after senior leadership of the Coastal and Hydraulics, Environmental, and Information Technology Laboratories teamed resources to create a center to develop and apply management tools for complex environmental systems.

ESMAC's corporate structure allows the ERDC to quickly and efficiently deliver products and capabilities with minimal management overhead or restructuring. This horizontal structure, in lieu of the more traditional vertical corporate structure, can extend beyond ERDC boundaries to sponsors and partners.

"The idea to establish a modeling center is at least six years old, but EMSAC became functional about six months ago," said Dr. John Nestler, EMSAC director.

EMSAC originated after significant studies and projects showed that close coordination and technical interaction between ERDC laboratories are required to successfully execute multi-disciplinary, large-scale investigations. The center forms technical teams of engineers and scientists to solve complicated environmental problems. EMSAC advances system-wide applications of predictive environmental modeling, assessment, and management tools for the Corps of Engineers, the Army, the Department of Defense, and the nation.

Examples of system-wide applications include the Puget Sound Nearshore Ecosystem Restoration Program, the Louisiana Coastal Area Restoration, Upper Mississippi River System Restoration, and the Comprehensive Everglades Restoration Program.

"A complex, system-level problem typically features some or all of the following attributes: high-resolution multi-dimensional forecasting tools; multiple resource categories, such as water, water quality, and valuable sport, commercial, or threatened and endangered species that must be linked; broad spatial scales like upland terrestrial areas, tributary streams, and freshwater or estuarine receiving waters that must be encompassed; and multiple media (rain, wind, groundwater, and surface water) that must be interfaced," Nestler said.

EMSAC's purpose is to:

- Focus on technically complex, multi-disciplinary hydrodynamic, hydrologic, ecological, and other environmental research and development needs related to ecosystem assessment and forecasting.
- Focus on effective applications of science and engineering, information technology, modeling, and informatics in support of alternative analysis and decision making in an environmental context.

One EMSAC focus is on R&D for ecosystem assessment and forecasting

- Focus on comprehensive environmental management by effectively integrating activities with ERDC R&D programs and reimbursable efforts to address broad national needs related to achievement of environmental sustainability.

"My goal is to provide opportunities for all ERDC scientists to participate in teams that engage some of the most difficult ecosystem restoration challenges in the U.S. and maybe other parts of the world," Nestler said. "EMSAC seeks to provide a boundary-free forum where scientists working in many disciplines and in different laboratories can collaborate and develop the healthy intellectual synergy necessary for solving complex problems. If we can achieve these goals, ERDC can be the premier environmental modeling and assessment center in the world."

EMSAC brings scientists and engineers together to study system-wide applications, such as the Louisiana Coastal Area Restoration program

To gain a better understanding of sediment research needs within ERDC and the Corps, EMSAC is sponsoring a series of workshops for ERDC employees. The workshops will be held every six weeks and are designed to bring together people who conduct similar types of sediment work across ERDC in hopes of integrating work. The first EMSAC workshop was conducted Feb. 17 and included 50 participants from ERDC's seven laboratories.

"The goal of our first workshop was to get acquainted and become familiar with the type of sediment research and investigations that are ongoing at ERDC," said Dr. Charlie Berger, EMSAC's Sediment Transport & Geomorphology team lead. "This workshop gave us a chance to discuss the types of problems ERDC labs are asked to solve and how these issues are being addressed. For example, in Coastal and Hydraulics, this would involve physical sedimentation problems in rivers, estuaries, and on the coast, whereas the Environmental Laboratory would be more concerned with the chemical characteristics of sediments," Berger said.

Future workshops will discuss the strengths and weaknesses of sediment work being done in the labs. EMSAC also plans to post minutes of the workshops on the Internet for others to view.

"Working together internally will eventually make it better for the customer," Berger said. "If we align tools and resources, we can begin to serve our customers more efficiently."

For more information regarding EMSAC, contact Dr. John Nestler at 601-634-2720, or by email at *John.M.Nestler@erdc.usace.army.mil*. If you are interested in attending an EMSAC workshop, contact Dr. Charlie Berger, 601-634-2570, or email *Charlie.R.Berger@erdc.usace.army.mil*.

Understanding the physical and chemical properties of sediment is essential for navigation on rivers and in coastal areas

Afghanistan