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Ripple Marks

The Story Behind the Story BY CHERYL LYN DYBAS

Newest UNESCO World Heritage Site

Vast Wetland Complex In Land-Locked Kazakhstan Protects World's Most Northerly Pink Flamingoes

Saryarka, it's called, this mosaic of wetlands and lakes in land-locked Kazakhstan that is one of UNESCO's newest world heritage sites.

In the midst of the vast Central Asian steppe, Saryarka blankets Kazakhstan's Tengiz-Korgalzhyn and Naurzum Nature Reserves.

With the addition of Saryarka in August, UNESCO's World Heritage List numbers 878: 678 cultural and 174 natural sites, with 25 mixed cultural and natural sites, in 145 countries.

Saryarka was named to the list for its 3,000 square kilometers of lakes and wetlands that provide feeding grounds for 15 million migrating birds, including 2.5 million geese, and 800,000 nesting waterfowl.

It protects the world's most northerly greater flamingoes, known for their pinkish-white color.

The area also shelters more than half the species of flora native to the steppe

ecosystem, as well as the critically endangered saiga antelope.

Saryarka translates as "yellow back," a reference to the region's swaths of feather grass steppe. These grasslands, covering central and northern Kazakhstan, were once home to the legendary Kypchak nation, a tribe of horse-masters who controlled the steppe from Central Asia's Altai Mountains to the Volga River in Russia. Kazakhstan's post-U.S.S.R. capital, Astana, was established in 1997 smack in the middle of this seemingly endless plain.

As one Astana citizen asks, "where else should people of the steppe build their capital, but in the steppe?"

Some 135 kilometers to the southwest of modern, urban Astana—with its Space Needle-like observation tower, *Baiterek* ("Tree of Life"), surveying the landscape—lies the heart of Saryarka. Here, hydrology, chemistry, and biology follow age-old seasonal dynamics. A sea of reeds has evolved

over centuries, through complex wet-dry cycles. This extensive water basin lies at the crossroads of two important migratory bird routes: the Afro-Eurasian and Indo-Central Asian routes.

"The wetlands of Tengiz-Korgalzhyn and Naurzum are key stopover points for migratory birds, many of which are globally threatened," said David Sheppard, director of the IUCN (International Union for Conservation of Nature) Protected Areas Program. "Saryarka offers them safe haven on their journeys from Africa, Europe, and South Asia to breeding grounds in western and eastern Siberia."

The region has the same outstanding natural value as sites like Yellowstone National Park, believes Vitaliy Gromov, director of the Association for the Conservation of Biodiversity of Kazakhstan (ACBK). "But Tengiz-Korgalzhyn is under threat because of a need for freshwater for Kazakhstan's growing capital city, and due to wastewater dumping," said Gromov. "The UNESCO designation is important for conservation efforts not only in Saryarka, but throughout Kazakhstan, and will help protect globally significant wetlands and steppe."

Naurzum is important for lesser white-fronted geese, red-breasted geese, and Siberian cranes. Tengiz-Korgalzhyn is a key site for Dalmatian pelicans, black-winged pratincoles and sociable lapwings.

More than 40% of the flyway for Central Asian waterbirds occurs in this region, report scientists Holger Schielzeth of the Max Planck Institute for Ornithology, Maxim Koshkin of the ACBK, and Alexej Koshkin of



The UNESCO Saryarka World Heritage Site protects greater flamingoes.

Photos courtesy of Ilya Raskin, Rutgers University

Background photo. Saryarka—steppe and lakes of northern Kazakhstan. Photo copy-right IUCN, Chris Magin

the Korgalzhyn *zapovednik* (nature reserve) in a paper in the March 2008 issue of the journal *BirdLife International*. More than 70 wetlands were surveyed; each supported some 20,000 waterbirds.

The area is of equal importance to the Volga River delta in Russia, the researchers found. The Volga delta is the largest inland river delta in Europe; it forms where Europe's largest river system, the Volga, meets the Caspian Sea. The delta has been protected since 1919 by one of the first Russian nature preserves, the Astrakhan Nature Reserve, and is a staging area for many species of waterbirds.

In Kazakhstan, Schielzeth and others discovered that the importance of lands surrounding wetlands—like those of the Korgalzhyn *zapovednik*—is often overlooked. "It was long known that Korgalzhyn is a good site for birds," said Lars Lachmann, conservation program officer for the Royal Society for the Protection of Birds, and a co-author of the *BirdLife International* paper. "Now it's clear that the area crucial for the survival of both breeding and migratory birds extends well past the borders of the reserve."

Human activities are restricted within the Korgalzhyn reserve, but the area just beyond its edges was previously cultivated for crops. As agricultural subsidies in Kazakhstan end, the land is turning to other uses.

"Outside the reserve's lakes and wetlands," said Gromov, "illegal hunting and fishing, and powerlines, are major issues, ones that should be monitored carefully in the future."

Conservation of Kazakhstan's inland waters, he said, doesn't end at the waterline.

DNA Barcoding Reaches the Deep Sea

More than 600 new species of animals have been described since the 1977 discovery of chemosynthetic environments at deep-sea hydrothermal vents and hydrocarbon seeps, "yet biogeographical studies are hampered by a lack of information on these species' distributions," according to Shannon Johnson and Robert Vrijenhoek of the Monterey Bay Aquarium Research Institute in California and Anders Waren of the Swedish Museum of Natural History in Stockholm.

Writing in the March 2008 *Journal of Shellfish Research (JSR)*—a special issue dedicated to malacologist Melbourne Carriker (1915–2007) of the University of Delaware—they posit that DNA barcoding offers considerable promise for solving the problems associated with traditional biological identifications in the abyss. "It can unmask cryptic species, link distinct life stages or dimorphic sexes, identify partial specimens, and provide a cost-effective means for species identifications by nonspecialists."

Johnson and colleagues applied DNA barcoding to deep-sea limpets (Gastropoda: Lepetodrilioidea), the most abundant and diverse gastropod group at hydrothermal vents worldwide. "Experts have recognized 14 species, but genetic studies have begun to reveal geographically widespread complexes involving cryptic species," state Johnson and co-authors in *JSR*.

The researchers obtained DNA barcodes from several hundred specimens representing 12 of the 14 species. The limpets were collected with manned and unmanned submersibles during oceanographic expeditions that took place between 1988 and 2007, and that visited numerous hydrothermal vent, seep, wood-fall and whale-fall localities around the world. "These tiny gastropods were typically sampled as 'bycatch' with larger vent taxa," said Johnson, "primarily bivalve mollusks and vestimentiferan polychaetes, on which the limpets reside."

DNA barcoding provided a useful tool, the scientists found, for distinguishing among *Lepetodrilus* lineages. Twelve described species for which the researchers had suitable samples "represent distinct evolutionary lineages," they report in *JSR*, "and are more versatile ecologically than previously believed."

The species' sequences and images have been deposited in the Barcode of Life system, "where we hope they will facilitate future identification of these relatively featureless deep-sea gastropods," said Johnson.

Mel Carriker would have been pleased to see these new directions, believes Richard Lutz of Rutgers University in New Brunswick, New Jersey, one of the special issue's co-editors.

A 1996 paper of Carriker's compared studies of the marine flora and fauna of the eastern United States to a systematics odyssey. As Johnson's *JSR* paper, and those of some 20 other authors in the special issue underscore, Carriker's legacy is his enthusiasm to continue the quest for knowledge, and to embark on the odyssey.



Photos courtesy of Robert Vrijenhoek, Monterey Bay Aquarium Research Institute

Ahoy, Matey: Here Be Pirates

Piracy on the high seas is on the rise, as recent events in the Indian Ocean off Somalia attest.

There is little evidence, however, to support concerns by governments and international organizations that pirates and terrorists are beginning to collude with one another, according to a June 2008 RAND Corporation report, *The Maritime Dimension of International Security: Terrorism, Piracy, and Challenges for the United States*.

The objectives of the two crimes are different—piracy is aimed at financial gain, while the goal of terrorism is political, states the report. Although both events are increasing, piracy is growing much faster and is far more common than terrorism.

“The maritime environment will likely remain a favorable theater for armed violence, given its expanse, lack of regulation and general importance as a critical conduit for international trade,” said Peter Chalk, author of the report and a senior political scientist at RAND, a nonprofit research organization. “While there is no quick fix for

eliminating piracy, we can rationally manage the threats within acceptable boundaries.”

Tell that to pirates who regularly patrol what have become the world’s most dangerous waters: those off Somalia, through which 90% of global trade flows.

In September, pirates there hit pay dirt: \$30 million worth of grenade-launchers, ammunition—and battle tanks—aboard the *Faina*, a Ukrainian vessel on its way to Kenya with military supplies.

By the end of September, Somali pirates were holding 14 oil tankers, cargo vessels, and other ships, with 300 crew members aboard, and demanding ransoms of more than \$1 million per ship.

Owners usually pay, a response that officials say is fueling the problem.

Worldwide, pirates attacked 263 vessels in 2007, an increase from 239 in 2006, according to the International Maritime Bureau’s Piracy Reporting Center, established in 1992 in Kuala Lumpur to combat escalating piracy.

Pirates from Somalia have attacked at least 60 ships this year, 17 in the first two weeks of September, according to the center.

Piracy long predates recent times. Its earliest documented instances are the exploits of ancient peoples who stalked Aegean and Mediterranean seafarers in the thirteenth century B.C.E. By the first century B.C.E., pirates flourished along the Anatolian coast, threatening the commerce of the Roman Empire. In 75 B.C.E., Julius Caesar was kidnapped and held prisoner by pirates, then later escaped.

Throughout history, pirates have taken up residence, sometimes forming nation-states, near waters where trade is plied. For example, a pirate republic took hold in Europe from the sixteenth through the eighteenth century. Called the Zaporizhian Sich, it was situated in the remote steppe and populated with Ukrainian peasants who had escaped from feudal masters. A distant location and the rapids of the Dnepr River served the pirates—who called themselves Cossacks—well.

Lest all pirates be thought of as male, among the most ingenious was Ireland’s Grainne Ni Mhaille, or Grania, known in English as Grace O’Malley. Grania (1530–1603) plied the waters of Clew Bay near Clare Island off the coast of County Mayo.

According to Irish legend, as a young girl O’Malley wanted to join a trading expedition to Spain with her father, the chieftain of the O’Malley clan. Told that her long dark hair would catch in the ship’s ropes, she cut it short to enable passage. In later years, during one siege, Grania instructed the crew to burn her ship’s sails down to the waterline. In the smoke, she and faithful followers paddled away atop “naught but the gunwales,” she’s said to have stated, to return to their exploits another day.

Grania, who was formally educated and spoke several languages, learned her trade from the seafaring O’Malley family. From chieftain on down, its members taxed all who fished in Clew Bay.

Grace O’Malley’s stronghold, Grania Castle, still looks out over Clare Island’s harbor.

Five hundred years after Grania’s time, during the period 2000 to 2006, the number of piracy incidents worldwide increased 68%, when compared with the previous six-year period. Acts of piracy totaled 2,463 actual or attempted incidents between 2000 and 2006.

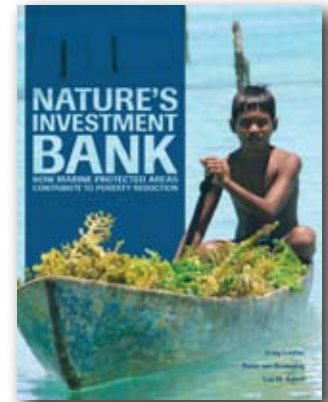


The pirate Grania once set out into Clew Bay, Ireland, in these boats, called currachs. Photo courtesy of Dorothy Leonard

Nature's Investment Bank

Marine Protected Areas

Result in Poverty Reduction



The problem is almost certainly greater than these figures suggest, researchers suspect, as nearly half of all piracy attacks are not reported because of fears of subsequent investigation costs and increases to insurance premiums.

With a drop in navy patrols and a boom in international trade after the end of the Cold War, Blackbeard's swashbuckling descendants stake out narrow points like the Gulf of Aden. Today, however, they carry high-tech weapons and communications gear, rather than swords.

What can be done?

The RAND study's findings suggest that U.S. policymakers focus too much on responding to worst-case scenarios rather than crafting policies to combat lesser consequence (but more probable) attacks that could strike cruise ships or passenger ferries.

The study concludes that there are at least four contributions that U.S. policymakers can implement to better safeguard the world's oceans: expand the post-9/11 maritime security regime; encourage maritime security collaboration by conducting regular, focused threat assessments; redefine the mandates of multilateral security arrangements to make sure they provide a greater role in countering maritime threats; and encourage the maritime industry to make better use of enabling communication and defensive technologies, while accepting more transparency in its corporate structures.

For now, ships-of-trade will be warned to stay 200 nautical miles from land—especially off Somalia's pirate-infested coast.

Ecotourism benefits both the environment of, and the people who live near, protected areas, according to results of the first study to analyze the link between biodiversity conservation initiatives and poverty reduction.

The conclusion is published in a November 2007 report by The Nature Conservancy—*Nature's Investment Bank: How Marine Protected Areas Contribute to Poverty Reduction*.

Craig Leisher, a policy advisor at The Nature Conservancy, Peter van Beukering, an economist at the Vrije Universiteit in Amsterdam, and Lea Scherl, a social scientist at The Nature Conservancy, conducted more than 1,100 interviews with residents of poor communities in four countries. They analyzed the effect of marine protected areas at sites ranging from small, one-community protected areas to those managed by large col-laborations. The locations were in Bunaken, Indonesia; Navakavu, Fiji; Arnavon, Solomon Islands; and Apo Island, the Philippines.

"Marine protected areas go a long way toward maintaining the food and income resources necessary to supporting coastal communities," said Leisher. "They also curb the use of destructive fishing techniques, and help coral reefs survive the impacts of climate change."

Among the report's findings:

In Indonesia's Bunaken National Marine Park, local communities benefited from an increase in income from dive tourism, and a share in revenue from park fees. Fishers in Bunaken spent 50% less time each year fishing than those in surrounding areas, yet their income was roughly equal, suggesting that protected area fishers have more time to invest in other activities.

In Fiji's Navakavu Locally Managed Marine Area, poverty was reduced by increased fish and shellfish catches. Incomes more than doubled for the community's 600 people.

Fish are "spilling over" from the no-fishing zones of the four marine protected areas to the waters outside, with improved fish catches, contributing to poverty reduction. People in Navakavu fish just beyond the marine protected area boundaries; 80% of the people there say that fish catches are better than before the protected area was established. These findings, said Leisher, support the increasingly well-documented perception of spillover effects from marine protected areas.

The areas' greatest boost to household income comes from new jobs, especially in tourism, according to the report. In Bunaken and Apo Island, those who switch to a new occupation in the tourist industry earn approximately twice as much. Some of those who changed jobs were originally fishers: 16% in Bunaken and 52% in Apo Island.

"For our people, a marine protected area is like a bank," said Weku Ratumainaceva, community leader of an Apo Island village. "Opening more branches of this 'bank' in developing countries will make a big contribution to poverty reduction in coastal areas there."