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Tragedy & TURMOIL

"THE GULF IS BLEEDING, AND NO ONE KNOWS IF IT WILL EVER HEAL."
John Wathen, Hurricane Creekkeeper

100% PCR Paper

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Pages 44-50

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WATERKEEPER® ALLIANCE

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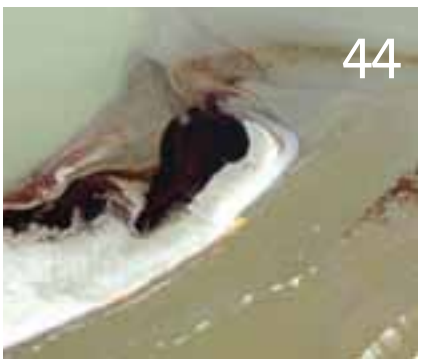

OVERDUE THANKS

In the last issue of the magazine, we neglected to thank Matt Carr for the incredible job he did documenting in photographs last year's annual conference in New York. Matt is both a consummate craftsman and a gifted artist and we are deeply grateful for his contributions not only to the conference but to the cause of clean water.

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Hurricane Creekkeeper John Wathen flew with SouthWings pilot Tom Hutchings from the Louisiana coast to ground zero of the BP oil spill to photograph the unfolding disaster.

Globally, the paper industry is the single largest industrial consumer of water and the third greatest emitter of greenhouse gases.

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Waterkeeper magazine is printed on 100% post-consumer recycled paper generated with wind power. We hope that other publications will join us in committing to protect our environment and building the market for environmentally sustainable products. The environmental savings from this switch are enormous:

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Tom Quinn Editor
Robert E. Murphy Consulting Editor
Giles Ashford Photographer
Rick Dove Photographer
Switch Studio Art Direction
Chaidi Lobato Designer
Erin Loukili Designer
John Wathen Photographer

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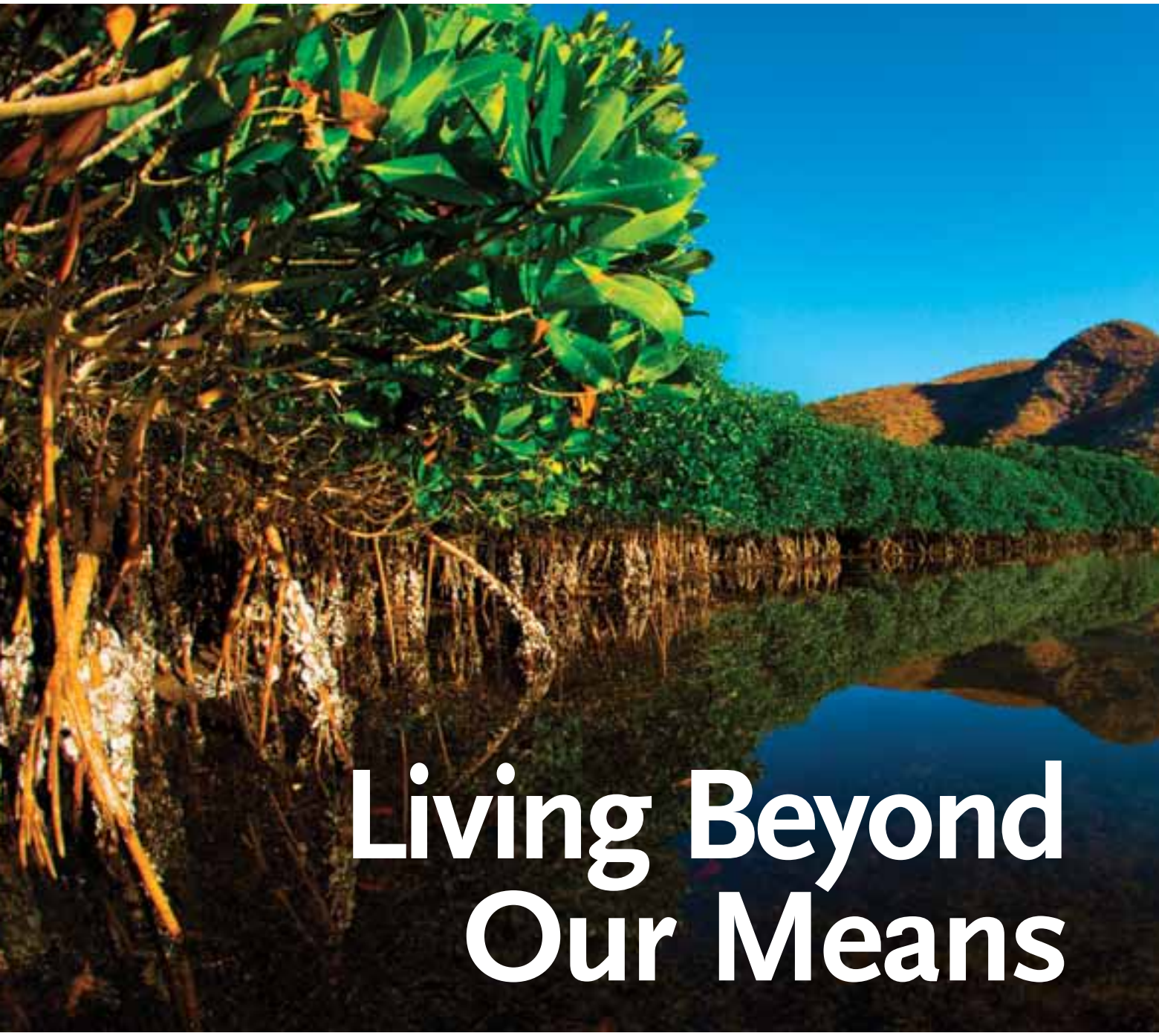

Living Beyond Our Means

Exequiel Ezcurra is the director of the University of California's Institute for Mexico and the United States at UC, Riverside. Octavio Aburto is a research scientist at the Scripps Center for Marine Biodiversity and Conservation. Jason Murray is a member of the Economics faculty at Moore School of Business, University of South Carolina

In December 2004, news broke in the Mexican media that the Mexican Fund for the Promotion of Tourism (FONATUR) and the National Finance Bank (*Nacional Financiera*) had donated 151 hectares of Caribbean coastal land to the development company "Golf and Resorts" for the construction of the *Costa Cancún* project. FONATUR's justification for the transaction was that the plot was a swamp, covered by lagoon-flooded mangrove forests that had "no economic value."

Environmental scientists in Mexico were alarmed and insulted. Many of them were involved in a United Nations project called the Millennium Ecosystem Assessment, which had clearly demonstrated the value of the ecosystem services provided by coastal lagoons. To their eyes, the destruction of a large expanse of the extremely rare, species-rich, Caribbean dwarf mangrove seemed inconceivable. Governmental agencies had given away federal land explicitly to be dredged and filled for development, destroying the original ecosystem, and were calling this process "land reclamation," as if they were adding value to previously worthless land.

Here was a clash between radically different visions of the world. To environmentalists the value of coastal wetlands, especially mangroves

ALL PHOTOS BY OCTAVIO ABURTO

Where some see a worthless swamp, scientists see an immensely valuable natural resource.

By Exequiel Ezcurra, Octavio Aburto and Jason Murray

and coastal lagoons, was obvious. Such areas were prime examples of "natural capital." Economic development agencies, on the other hand, base economic valuations on short-term revenue projections. From their perspective, the construction of a golf course and a housing development for tourists was a way to generate jobs and income, and it did not matter if this were achieved by destroying mangrove wetlands, which they perceived as without any real value or use.

In fact, they were far from valueless, although no serious effort had yet been undertaken in Mexico to put an objective value on the services provided by these ecosystems.

Similar threats to wetlands are now mounting all along the Pacific coast of Mexico, particularly in the Gulf of California, which is the northernmost limit for the distribution of mangroves in the Eastern Pacific. Although the region has a low population density, there is increasing pressure to transform mangroves into tourism developments and other commercial projects, such as shrimp farms. In many cases, this would require dredging for marinas and channels, resulting in diminished water flows, which would have negative effects on the water flows and quality in the local lagoons and estuaries, and threaten the health of the remaining mangroves.

Official government statistics indicate that the Gulf of California is already losing mangrove forests at a yearly rate of two percent, due to sedimentation, water pollution, deforestation and land-use change. These losses would likely endanger the myriad fish, mollusks and crustaceans that live in these ecosystems, which provide habitats in which juvenile fish are protected by the submerged, slender stilt roots of the red mangrove trees that normally grow along the fringes of mangrove forests. These fish also feed on the organic matter produced by the forests as they shed leaves into the flooded understory.

Here was a clash between radically different visions of the world.

In order to evaluate the ecological services provided by mangroves to local fisheries, we correlated official landing data for blue crabs and mangrove-related fish, such as mullet and snappers, with the amount of fringe mangrove within a 50-mile radius of the landing port. The results have shown a very high correlation between mangrove habitat and fish yield: the larger the length of fringe mangrove, the higher the landings recorded. This relationship is critically important for a region in which more than one-third of all artisanal fishery landings consist of mangrove-related species.

The Gulf of California and the Baja California Peninsula contain some 210 thousand hectares of mangrove and more than 500 kilometers of fringe forest. This habitat shelters young fish and crab that will mature in open waters and provide an annual average catch of 11,600 tons for the region, generating an annual income of US$19 million for local fishers. Because the fringe forest is about 10 meters wide, the area covered by one kilometer of fringe forest is around one hectare. Hence, each hectare of red mangrove where the juvenile

fish seek refuge yields landings valued at about US$37,500 annually to the local fishers.

If $37,500 is the "interest" provided annually by the "natural capital" (a hectare of fringe forest), what then is the total value of this resource? This estimation is known by economists as the "discounted value" of a resource. In this case, we want to know the present-day value of the natural capital that would yield, over a certain number of years, an annual interest to society of $37,500. Using, conservatively, a period of 30 years (the usefulness of mangrove forests should last much longer than that) and a standard interest rate of 5 percent, the present-day value of one hectare of mangrove fringe for the local economy can be estimated at US$ 605,000. In other words, we would need an investment of about $605,000 to replace the loss of income that one hectare of mangrove provides.

We recently published these results in the *Proceedings of the National Academy of Sciences of the United States of America*, and they were received by Mexican and international media with an unexpected degree of interest and concern. Although our estimate of the value of fringe mangroves seemed to many to be surprisingly large, it may actually be greater, since we only considered local benefits generated by fisheries and did not take into account other indirect values of mangrove ecosystems, such as coastal and wildlife-habitat protection, biodiversity conservation, water-cycle regulation and pollution trapping, as well as their effect on ecotourism.

Around the time our study was published, Robert Costanza, director of the Gund Institute for Ecological Economics at the University of Vermont and co-founder of the International Society for Ecological Economics, and his collaborators estimated that the loss of storm-protection services provided by one hectare of coastal wetlands in the Gulf of Mexico corresponded to an average increase in the cost of inland hurricane damage of about US$33,000. (Their definition of wetlands included not only mangroves, but also other types of floodable coastal ecosystems such as marshlands). Hurricanes, however, do not hit each coast segment every year, so, taking into account the annual probability of hits by hurricanes of varying intensities, they found that the mean annual value of the storm protection services of coastal wetlands was about US$8,240 per hectare. In other words, on average, each hectare of coastal wetlands provides the coastal inhabitants of the Gulf of Mexico annual savings of approximately $8,240 in hurricane mitigation. If, once again, we equal the value of these coastal protection services to the interest of the natural capital, we can work the investment formula backwards to estimate the value of the natural capital—the present-day value of a hectare of coastal wetlands — at about US$160,000.

Many commercially important open-sea fish species, such as the yellow snapper, spend part of their life cycle in the rich waters of the mangrove fringe.

Further serious, robust and rigorously peer-reviewed studies such as these will increase our awareness of the immense and unappreciated value of the environmental services provided by coastal wilderness. But the research published in the last two years has helped us to understand a lot about the value of these services. It has shown clearly that when a coastal wetland is dredged and transformed, immensely valuable ecological services are lost forever. The changes may be profitable for the individual developer who has received a concession to build in what previously was a federally owned wetland and who has not paid for the real value of the habitat that is being destroyed. But it represents a serious net loss for other members of society, such as the local fishers, who watch helplessly as the productivity of their resources declines irreversibly. We are now working with Mexican civil organizations and governmental agencies to ensure that future laws and regulations take these issues seriously into account.

Changes that may be profitable for the individual developer are often a serious net loss for other members of society.