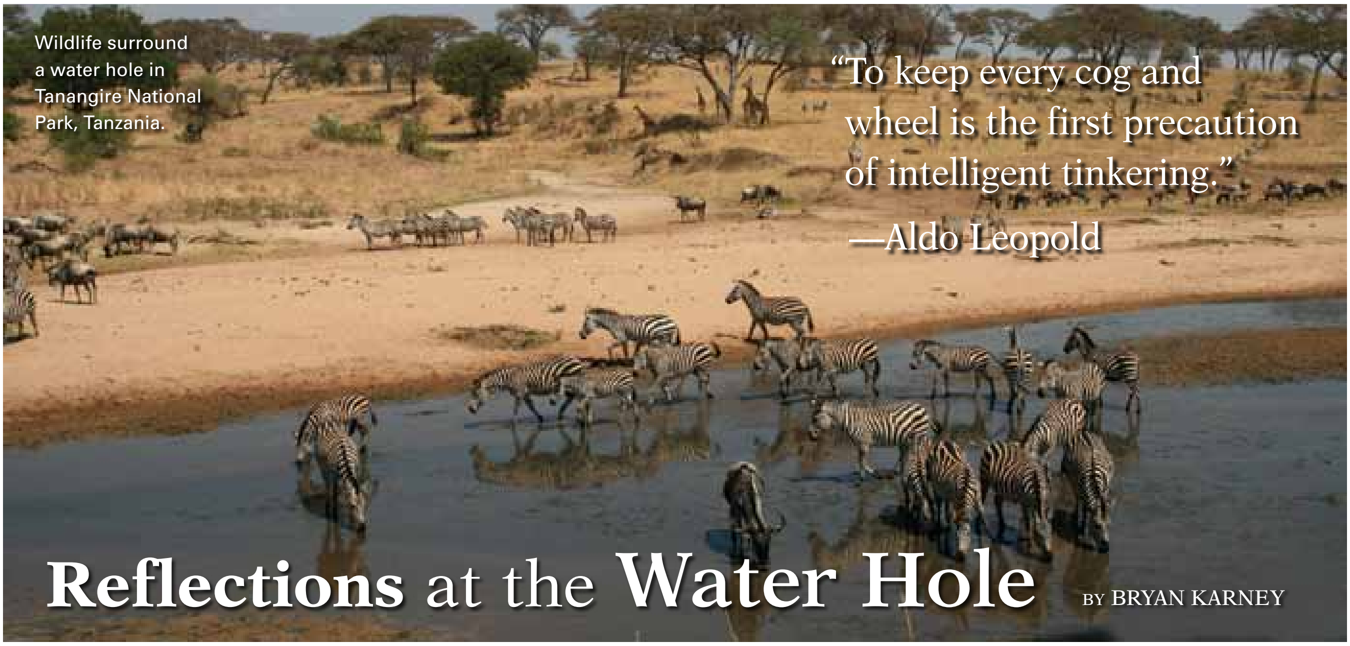

Wildlife surround a water hole in Tanangire National Park, Tanzania.

Credit: Peter West

"To keep every cog and wheel is the first precaution of intelligent tinkering."
—Aldo Leopold

Reflections at the Water Hole

BY BRYAN KARNEY

THE MEMORY IS VIVID: the parched, dusty East African savanna, the grassy plain dotted with elegant acacia and the rarer baobab twisted into mysterious shapes. In the foreground, a social congress of animals concentrated at their water hole, lying tranquil under the lengthening afternoon shadows.

After many years, the scene still reminds me of water as central and sustaining, the foundation of a complex system of animal and plant communities that reach beyond the limits of sight and that run as deep as the termites and as high as the clouds.

Visually abundant on this planet, present in three phases, water possesses an improbable set of physical, chemical and biological properties, often dynamic, invariably vital, mediating health and sickness, bringing both prosperity and destruction, both by its overwhelming abundance or its striking absence.

Like the water hole, the remarkable properties of water arise from the wholeness of its structure and the company it keeps.

A single water molecule is fundamentally asymmetric: one side hydrogen-rich and statistically lacking in electrons, and thus slightly positive charged, and the other relatively hydrogen-free portion being disproportionally rich in electrons and carrying a slightly negatively charge. These opposite charges naturally attract and cause the water molecule to have pronounced pull on other water molecules in the vicinity. When combined with the chaos of temperature and turbulence, the result is a dynamic and transitory set of free alliances and changing allegiances. Water is more a flickering community of H2nOn than a set of independent and colliding H20 pellets.

The resulting molecular stickiness is at the heart of water's properties. Here we mention but one—that water has a high latent heat of evaporation. The origin of this property arises directly from water's nature: since water molecules are bound together with a large electrical force, it takes considerable external effort to pull them apart. Thus, water has a remarkably high latent heat, requiring almost 2.5 million Joules to vapourize a kilogram of water at room temperature.

The direct consequences turn out to be immense. First, each cubic kilometre of air above this East African water hole contains the energy equivalent of many millions of litres of gasoline, a reality dramatized by every thunderstorm or hurricane. This latent heat provides one of the most important transfers of energy between the Earth's surface and the atmosphere, cooling the surface and warming the atmosphere. This energy generates the giant energy transport systems involved in atmospheric circulation and the hydrologic cycle itself. These latent heat transfers, through evaporated sweat or moisture lost during respiration, allow the animals gathering at the water hole to survive the heat of the day. The global circulation system that produced this water hole, and the biological system that depends on it, both turn on the axis of water.

Every drop of water that we might consider is intrinsically involved in a network or relationships and inter-dependencies, whether in a groundwater reservoir, a flowing stream, or in the vast arial extent of a Great Lake. Wherever water is found, connections engage and mediate a complex set of physical, chemical, and biological relationships.

Because of the overwhelming complexity of the universe, and the finite nature of human capacity, we turn it into more manageable compartments. It's essential, but also dangerous—reality is not so easily divided. Water resource evaluations assess the triple bottom line by attempting to include economic, social and ecological realities. It's a step toward wholeness, but in a moment's reflection at a water hole, it's good to recall that water's nature defies categories. The imposition of even the triple-bottom line distorts the immense presence that lies before us and at which animals quietly drink. WC

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