

Riverine Natural History

During the last few years the *Natural History Bulletin* has published a number of articles dealing with life in rivers, and the ways in which local people directly depend on river fish and other populations. The Mekong River and its tributaries have been in particular focus, as is well justified by the Mekong's size and importance to the six riparian countries that share in its benefits. Large rivers are among the least understood of all ecosystems; yet they are vitally important to the livelihoods of local people who live on or near their banks. It is not easy to see and catch the animals that live in rivers. Most people, except for those who have fished for a living, are not aware of how many kinds of animals live in rivers, their habits, and how they obtain food. The complex energy relations of animal communities that live in rivers are not well understood by scientists either. The major input of energy into fast-flowing rivers is from detritus (dead leaves and other organic material) that washes in from upstream terrestrial communities. Rivers export a lot of this energy to estuaries and the ocean, and to flooded backwaters such as the Great Lake of Cambodia. Slow-moving rivers also have important planktonic communities.

The natural seasonal flow regimes are also important to the life cycles of all organisms present, and hence important to the people who depend on riverine resources. River inhabitants have both long "vertical" (up and down stream) migrations and shorter "lateral" movements (between the river bed and inundated shore habitats). River bank plants and animals also tend to be rather specialized in habits and are adapted to the seasonal floods, as violent as they often are. Because all organisms are adapted to the existing physical conditions and seasonal changes for completing their life cycles, artificially changing or "improving" a river in any way will make life more difficult for its inhabitants and will tend to reduce the river's biodiversity.

It has been estimated that there are at least 1000 species of fishes inhabiting the Mekong River and its tributaries, ranging from tiny to huge, each with its preferred habitat such as mountain brooks, cascades, under loose rocks, in sandy bottom, in deep mainstream pools, in calm shore areas, brackish estuaries, mangroves, etc. Riverine organisms depend greatly on the varied rocky or gravel habitats in the bed for hiding, reproducing or feeding. Canalization or impoundments destroy or completely alter such living space. Such alterations in the flow regime also reduce oxygen content and nutrient levels, as particulate materials tend to settle out.

The fragile, linear nature of rivers and the dependence of organisms on inflows of energy and materials from far upstream, create difficult management problems. Large rivers are "multiple use" environments offering diverse benefits to humans including transportation, irrigation water, power production, food, waste removal, and recreation. For these reasons, the "protected area" approach can rarely be used to conserve riverine ecosystems, except in remote forested headwaters. Hence, many riverine fishes have become endangered and their environments polluted. Unfortunately, we have had little success in managing rivers for optimal multiple use, and potential users and developers tend to encroach on rivers as common property resources. Local communities that have depended directly on rivers for food resources for centuries have no guaranteed rights or ownership, and they lose their livelihoods and homes when large water projects are implemented. Such projects, if they have any environmental impact analysis at all, undervalue or ignore the true value

of riverine resources and valley habitats to local communities, and to the nation. This is more often the result of lack of knowledge rather than of intent. For these reasons, we should actively promote the study of riverine ecosystems and the ways in which humans depend on them. We should also encourage local provinces and communities to seek a greater role in protecting and managing these resources.

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