

endangered wildlife, captivating landscapes and portraits of tribal people across the region. The book covers the more charismatic and widely known wildlife, but the main emphasis is on lesser known yet ecologically important and species-rich groups of organisms that are so special in the Himalaya, such as rhododendrons, ferns, fungi, invertebrates, small mammals, amphibians and reptiles. The maps are informative and provide the reader a good understanding of the overall geography of the region.

The book is divided into major sections: The Land, The People, The Plants, The Fungi and The Animals, each of which is divided into numerous subsections. Some of the middle subsections about plants and animals are perhaps the most arresting. The plant section offers a superb collection of rhododendrons, balsams, primroses and pedicularis (plant parasites). Among butterflies and moths, frogs and lizards, some of which are not yet described, the images of the Edward's atlas moth (*Archaeoattacus edwardsii*) and the Asian glass lizard (*Ophiosaurus gracilis*) are special, and a composite image of the courtship display of the Bengal Florican (*Houbaropsis bengalensis*) is truly spectacular. The alluvial flood plains of the Brahmaputra have been depicted along with highly endangered wildlife, including the pygmy hog, greater one-horned rhinoceros, and barasingha, amongst many others. They represent the diversity harboured by seasonally flooded terai grasslands, the once widespread habitats that have now lost much of their ground to agricultural fields and bustling townships.

The subtropical forests are represented by a diverse array of plants, including orchids and zingibers, and narrowly endemic mammals such as the golden langur and the hoolock gibbon. Hornbills and their associations via seed dispersal of several large tree species, and also with humans such as the Wanchos of the eastern Arunachal and the Nyishis of the western Arunachal, are lucidly shown. The freshwater and riverine forest ecosystems have been elegantly depicted by multitudes of butterflies, fish and rare birds such as the white-bellied heron and the ibisbill. The temperate wildlife is portrayed, among others, with images of the recently discovered Bugun liocichla, a narrowly endemic bird species whose geographic distribution, like that of the local Bugun community after which it is

named, is restricted to a small area in western Arunachal Pradesh. These forests are also home to some of the most charming and enigmatic of animals, such as the red panda and the Ward's trogon. This section also includes some recent rediscoveries, such as the lizard, *Japalura sagittifera*, rediscovered in eastern Arunachal nearly 60 years after its original description in 1940 from northern Myanmar. There is much to explore here.

The authors have dedicated a special subsection to rhododendrons, which attain greatest diversity in the eastern Himalaya. They have also described association of rhododendrons with their pollinators, especially sunbirds. The painting of the fire-tailed sunbird hawk-moth, an insect in mid-air is surreal due to its detail and a sense of action. Amongst the most exciting sections of the book is the one on life and scenery above the tree line. It has images of many rarely photographed animals including the strange-looking Tibetan sand fox and Pallas's cat. The black-necked crane is globally vulnerable but continues to successfully breed in the Trans-Himalayan region partly because most of the local humans in Bhutan and adjoining Arunachal Pradesh are Buddhists and let the cranes breed peacefully without much hunting pressure. The book pays special tribute to the remarkable flowers from alpine meadows and other higher elevation species, including *Meconopsis* that had enthralled Frank Kingdon-Ward during his plant-collecting expeditions to the Myanmar Himalaya. It also includes a beautiful image of the noble rhubarb (*Rheum nobile*), whose conspicuous, papery bracts adorn the alpine meadows as translucent towers of plants above the tree line.

The book understandably ends with a section on biodiversity conservation and sustainable development in the Himalayan region. The threats to biodiversity include large-scale development activities such as massive hydroelectric power projects in critical biodiverse landscapes, and other anthropogenic threats such as climate change, logging, hunting and man-made forest fires. The growing national demand for electricity has resulted in more than 150 proposed dams in Arunachal Pradesh alone. Some of the most important biodiversity hotspots and fragile ecosystems in Sikkim have already been irreparably damaged by recently completed projects and more are being destroyed as part of new projects

as we read this review. Human populations in the Eastern Himalaya are growing at a rate much greater than the national average, which is putting tremendous pressure on the remaining forests and shrinking rivers. Heart-breaking images show fire ravaging natural landscapes, massive dam building, and a clouded leopard pelt hanging in a Naga kitchen. With eroding traditional taboos about hunting, access to more deadly arms and ammunition, and growing human populations hungry for resources, two of the most worrisome threats to biodiversity in the Himalaya are going to be hunting and habitat destruction.

Overall, this is a high-quality book that presents the landscape, biodiversity and people of the Himalaya in an attractive package, which should easily engage nature lovers and naturalists alike. It also brings conservation issues of this fascinating and complex mountain in sharp focus. It is hoped that this book will increase appreciation for the lofty Himalaya among the general public as well as the policy-makers, and serve as a reminder of our responsibility to judiciously manage this important global biodiversity hotspot. This book should find place in the personal libraries of nature enthusiasts and any respectable wildlife- and conservation-related organizations.

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Kumudavathy River Rejuvenation Project. Y. Lingaraju, Sri Janardhan and Sri Abhilash. An Art of Living initiative, International Association of Human Values, No. 196, Arekere-Bannerghatta Main Road, Bangalore 560 078. 2013. 52 pp. Price not mentioned.

A river is a hydrological, geomorphic and ecological system that plays a key role in the freshwater cycle, balancing dynamic equilibrium between soil moisture, snowfall, rainfall, surface water and groundwater. It provides large number of social, environmental and economic services. A set of hydrological and geological

processes in the catchment like precipitation, evaporation, transpiration, infiltration, overland flow and groundwater flow, are responsible for generating the stream flow and controlling its distribution in time and space. A river system is, thus, a complex mosaic of interactions and relationships in its watershed. Faced with delicate challenges of multiple services, including water supply and irrigation, there is a need for integrated basin-wise management strategy. But lack of understanding of the riverine hydrology, environment and ecosystem, together with unregulated development actions without heeding to environmental and ecological laws have left majority of the rivers in India degenerated and sapped in flows. The National River Basin Conservation Plan is an outcome of this realization. The civil society groups, too, have launched mass awareness campaigns and action programmes in support of this national agenda. If the river does not flow, it dies, and along with it the riverine ecosystems.

'Kumudavathy River Rejuvenation Project' is an Art of Living initiative and a comprehensive plan of action. It is a part of the overall river rejuvenation programme of Arkavathy river, the lifeline of millions, but in decadence over the last three or four decades with degraded catchment and severely diminished flows. Kumudavathy is a tributary of the Arkavathy. Near their confluence is the Thippagondanahalli (T. G. Halli) reservoir constructed to supply water to Bangalore. With lack of inflow the T. G. Halli reservoir is now almost defunct, adding to the already critical water shortage of the city and causing enormous hardship to the people. This is due to uncontrolled urbanization, deforestation and degradation of the catchment, encroachment of lakes and water bodies, consequent reduction of groundwater recharge, groundwater overexploitation and drying up of wells even to depths of 100–150 m or more in some places. In short, degeneration of the Arkavathy river basin has ruined its riverine environment and ecology.

Rivers and groundwater reservoirs are both an integral part of the water cycle. Groundwater plays a vital role in sustaining perennial river flows. Hence, restoration of overexploited groundwater bodies is a crucial part of the river rejuvenation programme. Artificial recharge and rainwater harvesting are the two innovative means to augment groundwater and restore the depleted aquifers in the

Arkavathy basin. The story of the dead river Arwari in Alwar District, Rajasthan being revived through rainwater harvesting is all too well-known. Memoir 79 of the Geological Society of India (2011) presents a detailed study and plan for revival of the Arkavathy basin through rainwater harvesting and artificial recharge. Taking cue from this, the authors of this book studied Kumudavathy watershed based on microlevel surveys and hydrogeological inventory, supported by remote sensing and GIS. They have prepared this people-friendly report of Kumudavathy regeneration, including a step-by-step implementation programme. The scheme highlights water conservation and groundwater augmentation through rainwater harvesting as key to the rejuvenation of Kumudavathy.

The Kumudavathy regeneration plan moots erosion control through boulder checks, groundwater recharge through well recharge, and rejuvenation of water bodies like Kalyanis (step wells), tanks and tree planting. Thematic maps have been furnished for village-level planning and implementation. The boulder checks constructed across the first-order streams reduce the speed of water, promoting soil moisture, natural vegetation and groundwater recharge. This will help in arresting soil erosion and siltation of water bodies. The second and third-order streams are favourable for construction of recharge wells as the weathered zone is nearly 15–20 m thick with dense fractures. The infiltrating water will recharge the shallow aquifers and in turn deep aquifers tapped in borewells. The streams down the line in the lower altitudes will become effluent. Upstream near the confluence of second and third-order stream, recharge wells may be constructed with a borewell at the bottom. Step wells when desilted, will hold clean water for drinking even in peak summer and help in revival of wells around. There are also 223 tanks to be desilted and commissioned. It is also proposed to plant three lakh trees all along the stream network, which will help in arresting soil erosion, flash floods, and in infiltration to increase soil moisture and groundwater recharge. Written in lucid language, the report furnishes valuable maps depicting the geomorphology and proposed rainwater harvesting sites in 18 miniwatersheds of Kumudavathy.

The multiple other benefits accruing from this project include revival of

defunct borewells and open wells, protection of drinking water sources, rejuvenation of irrigation tanks, boosting of natural vegetation, as also production of food, fuel and fodder, and overall environmental development leading to eco-hydrological conservation.

But, however sound be the technical planning, implementation has equal share in its success. In contrast to other natural resources, management of water is primarily in public domain. Most of these water conservation and management projects fail because of the inability of implementing agencies to involve the people. Governance of created sources is another aspect often glossed over. Therefore, the plan envisages a three-pronged approach.

- (1) Volunteers of the Art of Living, committed to philanthropy, to be trained in water harvesting who in turn will teach and mobilize the local people spreading the message of emancipation of humanity and salvation from all sufferings.
- (2) Panchayat Development Officers to be trained on preparing action plans involving local NGOs and farmers.
- (3) The action plan to be implemented step by step using Panchayat funds.

Private companies, too, may be involved in the rejuvenation programme using corporate social responsibility funds.

Summing up, the plan highlights two vital issues in river regeneration: (1) key role of groundwater in revival of Kumudavathy and (2) involvement of people through spiritual motivation and environment awareness. The essence of this initiative has been best expressed in the words of spiritual guru Sri Sri Ravi Shankar, the mentor of the project:

'When every one considers what they can contribute to Society, we will have a divine society. ... Let the youth and citizens come forward and pledge 1 hour to the nation and volunteer for a better India.'

This is a welcome endeavour to save the river, its environment and ecosystem, and in turn make Bangalore water-secure.

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