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Source: Tropical Conservation Science, 1(3)

Published By: SAGE Publishing

URL: https://doi.org/10.1177/194008290800100301

Editorial

Recognizing the role of tropical scientists in tropical research

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The third issue of *Tropical Conservation Science* (TCS) contains eight papers providing a wealth of information on various aspects of conservation in tropical forests. The studies reported were conducted by local scientists from India, Brazil, Cameroon, Kenya and Côte-d'Ivoire and encompass a diverse set of topics. Some provide baseline documentation on plant community structure, seed dispersal modes, spatial distribution of tree populations and tree reproductive phenology. Themes of other papers relate to management of mangrove forests, bird species richness in riverine habitats, critically endangered African primates, useful plant species and primate seed dispersal and the use of molecular techniques for assessing the genetic structure of tropical hard woods. The following paragraphs provide a general overview of each paper in the third issue of TCS.

Tropical forests harbor high tree species diversity and the mechanisms that promote such diversity have been the subject of much investigation by tropical scientists. A well-documented trait of tropical forests is the high degree of aggregation of conspecific trees at various scales, which has been attributed to patchy habitat conditions or limitations in seed dispersal. The paper by **Datta and Rawat** addresses these issues and documents seed dispersal modes and spatial patterns of 128 tree species in a little known and biodiversity-rich tropical semi-evergreen forest in northeast India. Authors indicate that 78% of species are animal dispersed, with birds accounting for about half of these and that tree species distributions are to an extent limited by dispersal. Declines of hornbills, ungulates, bears, and primates, major dispersers for many tree species, as a result of human activity is likely to have consequences for the dispersal and recruitment of many tree species in these forests

The Amazon Basin harbors the most extensive tropical rainforests on the globe, but because of high deforestation levels it represents one of the greatest challenges for biological conservation. In many cases forest conservation consists of assemblages of fragments of mature forest in a matrix of anthropogenic activities and secondary vegetation, both dominated by pioneer tree species. **Bentos et al.** argue that in this landscape, pioneer tree species are critical first elements in the colonization of clearcuts and abandoned agriculture, determining -- together with landscape history – the rates of change and trajectories of secondary successions and playing critical community and ecosystem functions—providing resources for pollinators and seed dispersers, building soil structure, recycling nutrients, and accumulating carbon stocks. With this in mind, they also suggest that pioneer trees and their life-history traits, especially reproductive characteristics, could be important tools in the hands of land managers and conservationists. To support these ideas, Bentos et al., conducted a 4 year-long study of the flowering and fruiting phenology of 13 pioneers tree species in early successional forests of the Central Amazon. They found that while the pioneer community showed a variety of phenological patterns, as a whole tended to be characterized by annual flowering and fruiting, either continuously or seasonally. They

suggest that those species with continuous reproduction, starting at small diameters, may produce the most rapid cover; that those dispersed by bats and birds are likely to be spread more widely than those dispersed by primates or terrestrial mammals; and that a mix of bird- and bat-dispersed species is likely to facilitate recruitment of mature forest species also dispersed by birds and bats and will provide a highly diverse seed rain into secondary forest.

The Congo Basin, which runs through six central African countries, contains the second largest contiguous rainforest in the world after that of the Amazon. The Congo Basin rainforest covers 180 million hectares, spreading across the Democratic Republic of Congo (DRC), most of Congo-Brazzaville, the southeast of Cameroon, southern Central African Republic (CAR), Gabon and Equatorial Guinea. These forests are a special conservation challenge because of their high biodiversity and high levels of deforestation, resulting from logging, mining and agricultural activities. Cameroon's forests contain some of the Congo Basin's most biologically diverse, yet threatened forests, and their study and conservation is an urgent matter. The forests of southern Cameroon bordering Gabon are biodiversity-rich and harbor important populations of gorillas, chimpanzees and elephants. In 1998 the government of Cameroon established the Mengamé Gorilla Sanctuary and in 2002, working in close partnership with the government of Cameroon, the Jane Goodall Institute launched a project to protect habitat and biodiversity in the reserve while creating a connection between conservation and socio-economic improvement in communities bordering the sanctuary. Located in a priority biodiversity corridor on the border of Cameroon and Gabon, the Mengamé Gorilla Sanctuary plays an important role in emerging trans-boundary protected area initiatives. Mapping and profiling the vegetation of the gorilla sanctuary is still on-going and the paper by **Fongnzossie et al.** reveals important progress in this direction. The authors report the presence in the sanctuary of 10 different forest habitats characterized by high indices of tree diversity and high densities of trees per hectare. The authors emphasize that the 10 habitat units they classified are of equal conservation importance. The authors document extensive fishing, hunting, and non-timber forest production collection, as well as the establishment of cocoa and banana plantations within the reserve buffer zone and itinerant agriculture as important pressures on forest habitats.

Mangrove forests occur in the tropics and subtropics and are found world-wide. However, they have a very restricted geographic distribution in the areas where they occur because they only grow in saline coastal habitats. Mangrove forests are biodiversity-rich and provide important ecological services in the areas where they are found. Human population growth and activities along coastal areas in the tropics and subtropics has significantly reduced the original distribution of mangroves and continued over exploitation places remaining mangroves at risk. In west-central Africa these changes are already being felt in the form of diminishing fish stocks, species extinction, and vulnerability of human communities to tropical storms and surges in the region. Exploitation of mangroves for fuel wood, charcoal production, construction, and other uses have been identified as pervasive and intrusive threats to the ecosystem, particularly within coastal developing countries, where local communities depend on the use of these resources for their livelihoods. The study by **Njisuh Zebedee and Manzano** investigated mangrove wood and fish harvesting as it relates to fish smoking, an important component of local people's livelihood in south west Cameroon, that may be in conflict with the conservation and sustainability of mangrove ecosystems. The authors estimate that about 205 ha of mangrove forests are cleared annually in their study area for fuel-wood used to smoke fish. The study also reports that local people seem to be unaware of the need to maintain ecosystem functions. The authors note that mangroves which serve as breeding grounds for fisheries are contradictorily being sacrificed as fuel for fish smoking and suggest a series of measures (improving policy, raising awareness and developing sustainable use practices) to mitigate this.

The Coastal Forests of East Africa are a chain of relict forest and thicket patches set within savannah woodlands, wetlands and agricultural land. The forests extend from Southern Somalia to Southern Mozambique and west to Malawi. They have been defined by WWF as the Eastern Africa Coastal Forests Ecoregion and contain two subecoregions: the Northern and the Southern Zanzibar-Inhambane Coastal Forest Mosaics (www.worldwildlife.org/ecoregions). The Coastal Forests in Kenya are a part of the Northern Zanzibar-Inhambane Coastal Forest Mosaic, which extends from the Kenya-Somali border to the Tanzania-Mozambique border along the coast. These forests are characterized by a mosaic of vegetation types including evergreen forest, *Brachystegia* woodland, scrub forest and dry forest. They are typically found in small fragmented patches. The forests are rich in wildlife and also have high levels of endemism (www.worldwildlife.org/ecoregions). Coastal forests are used by local people as a source of medicinal plants, fuel wood, building materials, food and they help to maintain a regular water supply for towns and villages (http://coastalforests.tfcg.org). The Lower Tana River forest in coastal Kenya is one of these coastal forests, classified as lowland evergreen riverine tropical forest, a forest type that is rare in Kenya and probably in Africa. While it is known that these forests are rich in bird species, the distribution of the avifauna is poorly known. In their paper **Owino et al.,** provide information on forest structure and bird species composition in 14 patches of forests found in the Tana River National Primate Reserve. The authors report from their study the presence of 155 bird species in these forests providing new baseline information on the avian species assemblages present in the investigated area and discuss some of the conservation pressures on the native vegetation derived from fuel wood and timber extraction and unsustainable harvesting of some bird species]. In addition, they point out that some of the trees targeted for exploitation could be important to bird species persistence. It is important to note here that, recently, segments of the Tana River delta have become under pressure from the establishment of sugar cane plantations for biofuel production [2]

In spite of its biological richness and the endemism of its fauna and flora, the Upper Guinea forest region has received relatively little attention from biologists and conservationists. This is the case for the entire primate community occurring in the eastern part of the Upper Guinea forests. Preliminary surveys conducted throughout this and neighbouring regions highlighted extensive habitat loss and dwindling primate populations within this faunal zone. Considering this, the study by Sery **Gonedelé Bi et al.,** report recent surveys of primate species in the Tanoé forest, south-eastern Côte-d'Ivoire. The authors report the presence of 11 primate species, several of them classified as endangered and/or threatened by IUCN standards and one of which that has been listed among the 25 most threatened primate species in the world. The authors report that protected forests in their study area seem to harbor more species (N = 8) than unprotected forests (N = 6), but the latter are under threat from hunting, logging and other forms of forest resource exploitation including agricultural clearings (including recent oil palm plantation development – see [1]) and overexploitation of non-timber forest products. The authors stress the importance of the Tanoé forest as foci of conservation for primate diversity.

Molecular genetics is an important tool not only in basic studies of phylogeny, genetic variation and relatedness among others, but also for managing tropical forest resources that have important commercial value. Favoured for its aesthetic physical properties and its qualities, Teak wood (*Tectona grandis)* is becoming increasingly important in forest plantation development in Côte d'Ivoire. To preserve the genetic resources of this species and ensure the supply of genetically superior quality germplasm for improvement and plantations, a core collection of superior genotypes with large genetic diversity is a prerequisite. The study by **Fofana et al.,** on the use of molecular techniques to manage and conserve populations of Teak wood in plantations, is a case

in point. The authors report the use of site-specific recombinase (SSR) technology using microsatellite DNA markers to investigate the level of genetic variability, distribution of genetic variation and genetic relatedness in *T. grandis* grown in Côte d'Ivoire. Such efforts are important when one considers that during the last five decades, the demand for Teak wood has increased several-fold, resulting in extraction of trees from old plantations and natural forest. In monocultures, gene diversity is reduced with each generation of teak plantations as seeds are collected from selected trees in the existing plots. The authors stress that modeling simulations with molecular research will improve our knowledge of landscape patterns of genetic diversity within species distribution and help develop resource management plans that enhance conservation of natural Teak populations.

An estimated 80-90% of tree species in the tropics produce seeds that are dispersed by frugivorous animals, and the role of vertebrates in dispersing these seeds is increasingly understood to be a major factor in tropical forest regeneration and plant demography. Because of their high density in some habitats, along with high rates of frugivory and relatively large body size, primates have been shown to be a particularly important faunal group for seed dispersal in the tropics, impacting tree species reproduction. Many fruit species preferred by primates are also used by humans as a source of fruits, seeds, flowers, bark, leaves and wood. These plant parts also constitute an important component in the daily life of people living by the forest or even away from it. These botanical resources represent not only food -- many have medicinal properties; several can be used for construction, and some may have an ornamental value. In this context, the paper by **Kone et al**., map primate-dispersed plants and their documented uses by humans in the Taï region of Côte-d'Ivoire. The authors found that seven species of monkeys used about 75 species of plants as a source of fruit, 36 (48 percent) of which were used by local inhabitants for various purposes. The authors argue that while conservation of primate species is a critically important goal in itself, ensuring their protection in forest fragments may also protect the seed dispersal agents that sustain the persistence of plant resources important for human livelihood.

In short, the eight papers in this issue provide a glimpse of the multifaceted nature of tropical forest conservation and of its complex base. The research involves not only the gathering of basic information on plant community structure, plant seasonal rhythm, identifying seed dispersal agents, and profiling animal community structure, but also involves investigation into human impacts on tropical forests resulting from various facets of their livelihoods. Clearly, the social components of tropical conservation may be more difficult to measure than basic biological parameters, but are critically important for diagnostic assessments. The contents of the articles published in the third issue of TCS are consistent with this approach.

A recent survey of six international journals reporting studies in the tropics for the 1995-2004 period (N=1,985) [3] showed that researchers from tropical countries are under-represented in countries. 54% of the sampled papers involved research conducted in only 10 countries, scientific literature, with most papers having lead authors from developed demonstrating that geographical distribution of research in the tropics is unequal. Some regions (e.g. sub-Saharan African countries) were poorly or not represented at all. In the context of this important diagnostic study, it is significant to highlight here that each of the eight papers in the third issue of TCS have as a leading author a scientist from a tropical country and the majority of coauthors are also native to the tropics. In addition, papers in this issue of TCS report results of research in India, Brazil and in Africa. One major aim of TCS is to amend the trend reported above by providing tropical scientists with the opportunity to publish their conservation-oriented research in a high quality electronic peer-reviewed journal that is open-access, has no

page charges for publication and ensures world-wide dissemination of their conservation oriented research in a prompt fashion.

Tropical Conservation Science invites the global community of scientists, advanced graduate students, and conservationists working in the tropics to submit results of their research for possible publication in future issues of the journal. Further information is available at www.tropicalconservationscience.org

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Tropical Conservation Science has been registered in several indexing databases. Its inclusion has been accepted in CAB Abstracts and in the Directory of Open Access Journals (DOAJ).

Tropical Conservation Science has also been affiliated to EBSCO Publishing databases, (http://www.ebscohost.com). EBSCOhost databases are the most-used, premium online information resources for tens of thousands of institutions worldwide, representing millions of end-users.

Currently, TCS is under evaluation in Thomson Scientific (ISI Web of knowledge, Science Citation Index, Web of Science) and in Scopus.