



Photo: K. H. Redford

Yuqui hunters in the Bolivian Amazon

remaining tigers against the rights of the resident people. Nor does our political and economic system assign a value to the protection of the biosphere upon which we all depend. Nevertheless, we must secure the guarantees of public servants and private actors that they will act with the respect and care due to the world's remaining wildlife and to the rural people who co-inhabit these under-served areas.

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Shifting Livelihood Options and Changing Attitudes of Communities in the Garo Hills, Western Meghalaya

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The Garo hills in western Meghalaya in India comprise gentle undulating forested slopes at the edge of the country, adjacent to the Bangladesh plains. Although a significant portion of the state is reported to be under forest cover (ca. 70 %), ownership of over 65 % of land in the state by autonomous

councils, shifting cultivation, and intense hunting pressure are some of the factors that thwart traditional conservation themes here. Further, in the last decade, mining and monoculture plantations (e.g., cashew and citrus orchards), have replaced past occupations of communities in the Garo hills, such as paddy and shifting cultivation.

The Garos belong to the Tibeto-Burman stock; they drifted into eastern India through Tibet in 5,000 B.C. in search of fertile lands to cultivate. More than thirty villages, locally called *akings* are interspersed between the Balpakram National Park (220 sq. km) and the Bagmara Reserve Forest (44.4 sq. km) in the South Garo Hills district (Khan

et al. 1997). The landscape is mottled with patches of shifting cultivation fallows at varying stages of succession, active farms, settlements, orchards, paddy fields in the valleys, and waterbodies. The forests in the South Garo hills are significant for many reasons—they harbour species such as the tiger (*Panthera tigris*), clouded leopard (*Neofelis nebulosa*), Himalayan yellow-throated marten (*Martes flavigula*), hoolock gibbon (*Hoolock hoolock*), serow (*Capricornis sumatraensis*), Asian elephant, Chinese pangolin (*Manis pentadactyla*), the stump-tailed macaque (*Macaca arctoides*), and have high levels of endemic floral diversity. It is therefore imperative to conserve these lands to provide a buffer and corridors for wildlife in the adjoining protected areas.



Photo: Samrakshan Trust

The landscape with active cultivated patches, fallows and secondary forests

Jhum cultivation

Shifting cultivation, also called forest agrarian system or *jhum* cultivation in India, is a form of cultivation that has been practised across the world since the neolithic epoch to the present age. Although this method of farming may seem ecologically destructive, since it involves slashing and burning of forest, it provides subsistence livelihoods for at least 300-500 million people

worldwide. Essentially agriculturalists, the Garos have been practicing shifting cultivation for a few thousand years to grow rice, ginger, millets, tapioca, chillies, yam, and other vegetables in the biodiversity-rich tropical forests of the region. Research indicates that for *jhum* cultivation to be at least economically viable, if not ecologically sustainable as well, the fallow cycle (period within which land is re-cultivated) should not be less than a decade. For ecological recovery following shifting cultivation, a minimum period of 25 years for birds, 30 years for frog and lizard communities, and 50 years for plants has been envisaged from *jhum* fallows in Mizoram (Raman *et al.* 1998; Pawar *et al.* 2004). However, in the Garo hills, fallows are re-cultivated within 4-5 years due to increasing human population and unavailability of sufficiently old fallows, making the practice unsustainable for both people and biodiversity.

A relatively recently proposed model in this respect is to amalgamate *jhum* cultivation with agronomical inputs, to assuage its impacts on biodiversity as well as to improve productivity (Malik 2003). In the neighbouring West Garo Hills district, it has been demonstrated that apart from rice, all the needs of a few families can be adequately met from homestead agriculture. Home gardens—plots ranging from 0.5 to 2 ha per family, used for cultivation of vegetables, medicinal shrubs and herbs, and trees for firewood—have also been recommended.

Orchards—Monoculture plantations

The impacts of shifting cultivation can be considered to be relatively benign compared to the impacts of monoculture plantations on biodiversity as well as people. Many studies have shown that monocultures of economically important species such as teak, rubber, areca nut,

cardamom and coconut harbour low animal diversity, comprising mostly ubiquitous species, in comparison with natural vegetation types. In terms of the socio-economic impacts of plantations, cultivating orange orchards has not improved the income of people in the region, as the plantations fruit only for two to three years and precious habitat for wildlife is lost to such conversions. Often, people clear larger tracts of land the following year anticipating better profits. In the year 2004, encouraged by the North Eastern Council-funded Citrus Rejuvenation Programme, several households in the neighbouring West Garo Hills district abandoned *jhum* and established citrus orchards. The decision was a disaster, and the following year 51 households re-embraced their traditional practice of *jhum* cultivation. Similar projects have been planned or initiated for cultivating areca nut and rubber in the region.

Mining

The state is estimated to contain about 600 million tonnes of coal reserves and about 5,000 million tonnes of limestone. The detrimental impacts of coal mining on the environment and people have been documented from Jaintia hills in the eastern tip of the state. Among other impacts of rat-hole mining for coal, such as soil erosion, pollution of air and water, and loss of biodiversity, the region has also become perilously vulnerable to earthquakes. In the South Garo hills, the issue appears to be intensifying as each year the hills in the area are strip-searched for coal. This is a particularly serious issue near the Siju Wildlife Sanctuary where the coal residue is deposited in the Simsang river, which provides valuable fish and water

resource for the communities further downstream. The sulphur in the coal residues renders the water acidic, thereby affecting the fish-catch and the productivity of agricultural lands. The major obstacle to mitigating the impacts of coal mining in the area is that the livelihood of thousands of people is linked to the vocation. And the consequence of these lands being community-owned is that the Government is left with few avenues to abate the damage.



Photo: Samrakshan Trust

Mining close to Siju Wildlife Sanctuary

Hunting

Systematic studies on the hunting practices of the Garos are largely lacking. During the last two years, Samrakshan Trust has been working with the communities in an attempt to improve livelihoods and get an idea of the human-wildlife and the human-elephant conflict in the landscape. Hunting is likely to be relatively higher in the villages adjoining the Balpakram National Park, where gunshots were often heard and the skin of a Chinese pangolin and a pet stump-tailed macaque were encountered by the author.

Human-animal conflict

The Garo hills harbour one of the densest populations of Asian elephants as well as humans (about 53 persons / sq. km in the South Garo hills; Census of India 2001) in the country. Data on crop-raiding by elephants collected by Samrakshan Trust personnel between 2005 and 2006 in six of the *akings* indicate a twin-peak, one in the months of July-August and another in November-December. These peaks correspond with the harvest of summer and monsoon rice, respectively. The Garos supposedly revere elephants and affectionately refer to them as *mama dalgipa* (big uncle) and plead with them not to raid their crops. However, five carcasses of elephants were recorded by Samrakshan Trust from various *akings* within a year² and recently the Garos have started consuming elephant meat. Since not all elephant deaths get reported, this is indicative of the high intensity of human-elephant conflict in the region. A fact that complicates the situation is that the Forest Department has been lax in disbursing compensation for crops raided by elephants; INR about 40 crore is the outstanding amount to be compensated till the year 2002.

Some feasible options

A majority of the conservation issues in the Garo hills seem to have their roots in the lack of environment-friendly livelihood options for the communities. Some of the practical alternate livelihood options for the communities are:

- ❖ Several interesting trails along the Simsang river, along the Siju Wildlife Sanctuary, to the Chutmang peak (tallest peak in the South Garo Hills district: 1,023 msl) and other parts of the Balpakram National Park are available and can be accessed from

the villages in the landscape. Promoting responsible eco-tourism on these routes, employing locals as guides, and ensuring that the economic benefits of such endeavours reach the communities will alleviate livelihoods of at least a section of the communities.

- ❖ Sustainably marketing pottery, textiles and basketry handicrafts, which the Garos are adroit in producing, can also help improve the abject conditions of the communities of *akings* that are remote and bordered by the Balpakram National Park.

- ❖ According to the management plan of the Balpakram National Park, inclusion of land from villages present beyond the south-western boundary of the Park is still pending. This land, if acquired, can provide an important supplement to the Balpakram National Park and bolster its protection. A relocation programme that adequately addresses the socio-economic and cultural issues involved will not only provide the people from isolated villages better amenities but will also ensure better protection of the Balpakram National Park.

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BOOK REVIEW

Resilience Thinking: Sustaining Ecosystems and People in a Changing World.

Brian Walker and David Salt.
Island Press (2006).

Reviewed by Fred Nelson

Integrative Thinking for a Changing Planet

“Whenever we pick out anything by itself, we find it hitched to everything else in the universe,” noted John Muir over a century ago. As human knowledge grows and so does the complexity, not only of ecological systems’ biophysical components but also of their social, cultural, and institutional dimensions, it has become increasingly apparent that our way of organizing knowledge along disciplinary boundaries—particularly the relatively hard boundary between social and natural sciences—greatly limits our understanding of the world.

During the past twenty years, an ambitious group of multidisciplinary scientists called the Resilience Alliance¹ has emerged to try and develop a truly integrative framework for thinking about com-

plex systems. They tellingly use the term ‘social ecological systems’, in recognition of the counterproductive nature of treating the human and biophysical components separately. As the group’s work has grown and expanded, they have developed a web site and blog, a thick edited volume describing their ideas called *Panarchy* (Island Press, 2002), and an open-access journal, *Ecology and Society*².

The Alliance’s latest effort, authored by one of its leading scientists (Walker) in collaboration with a popular science writer (Salt), *Resilience Thinking*, provides the most accessible introduction to the group’s work, ideas, and concepts. The authors’ objectives are to provide “a plainly written account of what resilience is all about, and how a resilience approach to man-