zone (from where we presently get much of our data) is said to absorb only ~ 1 tonne of CO_2 during its lifetime, whereas a tree in a warm country (where photosynthesis occurs faster and for a longer duration per year), absorbs ~ 2–2.5 tonnes. If more studies could show this to be true, it means that developing countries in warmer climates should earn twice as much as they do now. This would tempt them to develop forests and other sinks. We also need to see if large and slow-moving sinks, on which human interference is fairly minimal, can be expanded.

But will this balancing of sources and sinks be sustainable in the long run? For this, we need to practice social engineering. The system must generate new funds and these funds should be used to produce income for the local people, so that they are motivated to ensure its sustainability. This has to be our second guiding principle.

So our mantra should be: Give equal importance to both sources and sinks of carbon, and make sure the people earn something from it all. The main advantage of the proposed approach is that each country can exploit its own resources as best as it can because equal emphasis is given to carbon mitigation and absorption. Countries that are richer in technology can concentrate on source reduction while warmer countries, for example, can concentrate on their forests and other sinks. All countries – rich, poor, cold and warm – must feel equally involved. It would also make people exercise greater vigilance against deforestation, and promote conservation of water (and wastewater), rainwater harvesting and recharging of groundwater – as water would be in greater demand than ever before. Finally, the system would be robust and sustainable as people would develop a vested interest in its continuation.

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The ‘living fossil’ shola plant community is under threat in upper Nilgiris

The Nilgiri hills, an integral part of the Western Ghats complex, is located between 10°38′–11°49′N lat. and 76°25′–77°15′E long. at the junction of the Eastern and Western Ghats. The altitude in the upper areas of the Nilgiris ranges from 1800 to 2500 m amsl. The Nilgiris is a component of the Western Ghats mountain range in India, which is recognized as one of the hotspots of biological diversity in the world[1]. The Nilgiri Biosphere Reserve (NBR) comprises the whole of Nilgiri District, parts of Coimbatore plains, Mysore plateau consisting of Bandipur National Park, Wyanad Wildlife Sanctuary, Mudumalai Wildlife Sanctuary, Silent Valley National Park and Nilambur plains[2]. The total area of NBR extends over 5520 sq. km. The natural vegetation of this region is classified as southern montane wet temperate forests and montane grasslands.

The closed evergreen forest, called the shola, occurs above 1700 m in patches in the higher hills of South India in the Nilgiris, Annamalai and Palani hills. Sholas are patches of stunted evergreen tropical montane forests which attain a low height of about 16–20 m. These forests have high ecological significance in protecting the head waters of rivers by holding up of water received by precipitation like a sponge, thus preventing rapid run-off. They are considered as a relict of an evergreen forest climax, pushed back to damper sites, by the combined effects of fire, frost[3], grazing, clearance for agriculture and the prevention of regeneration by rapid erosion of the soil. This shrinking ecosystem is home to several rare, endangered and endemic species, many of which face danger of extinction[4]. This non-regenerating and fast-receding shola forest is a dying community, more appropriately called a ‘living fossil’ community[5]. Most shola patches in the non-protected areas have been fragmented, degraded and encroached. Although most of the shola patches in the Nilgiris are naturally small, there is considerable human-induced fragmentation mainly in the vicinity of the settlements. At present, this floristically and ecologically important ecosystem is facing a new threat from the invasive exotic weed *Passiflora mollissima* (H.B.K.) Bailey.

Shola forests in the Nilgiris are highly species-rich when compared with other tropical rain forests. A common life-form which is poorly represented are the climbers, particularly lianas or woody wines. There are several native climbers found in the shola forests, such as *Clematis wightianus*, *Parthenocissus neilgherrensis*, *Rubia cordifolia* and *Tylophora pauciflora* which seldom reach the top of the canopy.

P. mollissima, a woody wine from the Andean highlands (2000–3600 m) of South America, has successfully invaded in the upper sholas of the Nilgiris, often climbing to heights of 20 m or more

Figure 1. Shola tree (*Syzygium calophyllifolium*) completely covered with *Passiflora mollissima*.

(Figure 1). This self-compatible forest pest is pollinated by birds and bees. It grows best in cool temperatures and occasional frosts, up to –2°C. Man has distributed this species as an ornamental and for its edible fruit to many regions, including India.

There are multiple mechanisms by which invasive species suppress the growth of the native flora. The direct competition of this weed is evident from the rapid dense growth above the shola trees. But in order to get a full picture regarding how this weed influences shola tree growth, multiple mechanisms need to be studied[6].

This forest pest invariably infects all forest trees in the study area. Dense curtains of the vine extend to the ground from canopy branches, sometimes causing the branches to break and also the toppling of trees during storms. Where the canopy has been opened, dense mats of vines also mantle the understorey trees and shrubs and inhibit regeneration of the native trees. This study has revealed that the most dominant tree species of this area (*Syzygium calophyllifolium* Walp.) is heavily infected, with the occasional death of trees.

Even though a number of exotic weeds such as *Chromolaena odorata*, *Cytisus scoparius*, *Lantana camara*, *Hyptis suaveolens*, *Celosia argentea* and *Leonotis nepetiifolia*[7] have been reported in the core and buffer zones of national parks in India, there has been no report on the invasion of *P. mollissima*.

Biological invasions are recognized as a leading threat to global biodiversity. Invasion is considered as the second most important threat to biodiversity after habitat destruction. Invasive plants are a major threat to natural ecosystems; they are difficult to control or eradicate, and require large amounts of effort and resources[8]. In order to eradicate this pest from NBR, appropriate action is needed from NGOs working in the area. It is the need of the hour to protect the last remnants of shola forests from the clutches of this bio-pesticide.

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Conservation of White-bellied Heron *Ardea insignis* (Hume, 1878) habitat in Namdapha National Park, Arunachal Pradesh, India

White-bellied Heron (*Ardea insignis*) is a critically endangered bird species with a current estimated population size of around 50–249 mature individuals globally[1]. It is described as 'solitary, wild and wary' tropical bird species preferring habitats such as the river banks with gravel and sand surrounded by subtropical forest. Apart from this, the species is also known to breed and roost in Chir pine forest[1]. The global distribution of the species is restricted to the foothills of eastern Himalayas in India, northeastern Bangladesh, Burma and Bhutan. In India it is distributed in West Bengal, Assam, Arunachal Pradesh and Nagaland[2]. Namdapha National Park (NNP), Arunachal Pradesh might act as a breeding ground of the species although specific documentation has not been done. It was also recorded in regions of Dholong River and the upper reaches of the Panchnoi River (Pachin River) and Dafla hills in Arunachal Pradesh[2]. The White-bellied Heron was kept under the endangered category and later on shifted to critically endangered in 2007 by IUCN, as the species was rarer than it was thought to be. Habitat destruction, hunting and pollution are some of the threats reported globally as the reasons for its rapid population decline[2].

The NNP (27°23′30″–27°39′40″N, 96°15′2″–96°58′33″E; 200–4571 m amsl) comprising of 1985 sq. km area is situated in the eastern Himalayan region of Arunachal Pradesh[3]. NNP is a home to many threatened, endangered and critically endangered floral and faunal species, including *A. insignis*. The bird was sighted twice in NNP during our visit (September–October 2011) on the banks of river Noa–Dehing (27°31′44.6″N, 96°23′24.7″E) at Naharbadi (Figure 1). It was sighted on a river bank with sand and gravel surrounded by tropical forests at an altitude of 360 m amsl, which is usually described as the perfect habitat for this bird to survive. During both encounters, the bird flew away at the slightest disturbance, disappearing into the nearby forest thickets, which were bushy and impenetrable. A local forest guard informed us that he used to observe a small flock of about 3–4 individuals near the lakes of FirmBase during winters. This was not the first time that it was recorded in Namdapha. However, there have also been other reports of this bird in Namdapha around Deban and FirmBase[2,3].

The river bank in Namdapha where *A. insignis* was sighted lies adjacent to a

Figure 1. A White-bellied Heron in flight.