The Occurrence and Distribution of Ethno-Botanically Important Plants during Secondary Succession in Semi Arid Ravines – Case Study from Gujarat, India.

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RESUME

Introduction

Tropical and subtropical dry forest accounts for 42% of the total global forest cover (Murphy and Lugo, 1986). These forests have been exposed to severe large scale damages through the cutting of valuable trees, creation of pastures, accidental or intentional fires (Gerhardt & Hytteborn, 1992) and as a source of firewood.

Tropical dry deciduous forests occupy the largest area (29 m ha) in India and constitute 38.2% of the total forest area in the country (Pachauri and Sridharan, 1998). Dry tropical forests, as they exist in Africa and drier parts of India are smaller in stature and are less complex floristically and structurally. Because of their simplicity and increasing population pressures these forests have become heavily degraded and their productivity as an all time low. Norman (1987) estimated that a 5-20 fold increase in tree planting would be required to meet firewood requirements in Africa alone.

Despite their past abundance and their continued over exploitation, very few studies have been carried out on the rate of vegetation recovery after protection from man made disturbances. While forest recovery in temperate regions have been related to physical factors, climate as well as socio-economic processes (Ohmann & Spies, 1998, Foster, 1992), limited information is available on the rates of recovery and species occurrences in the dry tropical forests of India.

Improper land use and faulty cultivation practices have caused serious soil erosion problems over many parts of Gujarat, with nearly 0.4 million ha of arable land being severely affected by ravines of various depths. Nearly 60,770 ha of arable land along the Mahi river are badly affected. This paper describes the chrono-sequence through 38 years of vegetation recovery and secondary succession, in a dry deciduous forest consequent to protection bordering the Mahi river, in Baroda district of Gujarat, and on the occurrence of plant species with values as non wood forest produce (NWFP).

Methodology

The study site is a twelve hectare area of degraded ravenous area which represents the Southern Tropical Thorn Forest (6A/1C 1) as described by Champion and Seth (1968). The site is a typical ravine with deep vertical cuts and exposed faces. The pH of

the soil varies from 7.8 to 8.8, water holding capacity ranges from 41-50% and the soils are classified as calciorthids. From 1960 onwards till 1998, complete protection was provided to the area and species inventory of grasses, herbs, shrubs and tree recruits appearing in three topo-sequences (ravine hump, ravine slopes and ravine bed) were recorded along with their abundance patterns., using standard techniques for phyto-sociological studies.

Results and Discussion

The number of species recorded in the initial years on the ravine hump and slopes were less than that recorded on the ravine bed due to higher moisture and nutrient fluxes in the lower reaches. After two decades the differences were smoothened out due to improvements in soil conditions and species migration due to protection.

Only 3-4 perennial grasses dominate the site like *Apluda mutica*, *Desmostachys bipinnata* and *Dicanthium annulatum* which are abundant within two years of protection and are useful as fodder for grazing animals. Herb species began to establish themselves within 2-6 years of protection. Among the many herb species recorded at the three situations. Species like *Rhynchosia minima*, *Sida cordata*, *Vernonia cinerea* and *Achranthes aspera* were the most common herbs. Roots of *R.minima* are used in making medicines for control of dysentery, leaves of *S.cordata* are used in control of various skin diseases while the paste of roots of *A.aspera* is used in the treatment of scorpion bites.

Shrub species began to appear within 3,4 and 2 years on the ravine hump, slope and bed, respectively after protection was enforced, but they began to dominate the site after 16-18 years due to their slow growing nature. One of the most abundant shrub was *Securingea virosa* which is used chiefly as firewood and its density varied between 460-700 per hectare across years. Fruits of *Ziziphus nummularia* are eaten, while the abundance of *Commiphora wightii* was low (300 plants/ha). This species is of great economic importance since the gum of this plant (locally called 'guggal') is used extensively in making incense sticks and also in the treatment of rheumatism and various skin disorders. The ravine bed supports a larger number of species (61) in comparison to the other two situations. Species like *Balanites aegyptica* were more abundant (density 1300-1545 per ha.) in this situation and the pulp of this fruit has traditionally been used for washing silk.

The occurrence of tree species was clearly related to the topo-sequence in the initial years but similarities began to appear after twenty five years. *Acacia senegal* was the most abundant species after thirty years on the ravine hump (2000 trees per ha), followed by *A.nilotica* (300 per ha.) and *Azadirachta indica* (270 trees per ha). On the slopes *A.indica* and *Holoptellia integrifolia* were abundant. On the ravine bed *H.integrifolia* and *A.nilotica* were abundant (tree density 3000 and 1000 per ha., respectively) along with *A.senegal* and *Prosopis cineraria*. All the tree species are useful as fodder and firewood, while *A.senegal* yields the 'gum arabic' of commerce which has considerable market value.

Species which occur in the dry tropical regions are characterized by high proportion of branch wood production, high wood density and high coppicing ability. It is due to these reasons that these forests have been so heavily exploited. But as this study reveals, these forests also support a high biodiversity of species which have various uses

and yield products of considerable commercial value. In order to make these forests more productive it is essential to involve rural and tribal communities in their protection through several institutional mechanisms that would cover protection, sustainable production and harvesting of produce. This effort also calls for more research on pathways and rates of forest recovery to different levels of disturbance and other factors that relate to the overall resilience of dry forests in the tropical regions.

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