Eucalyptus Plantation: Socio-Economic and Environmental Impact

Background: Eucalyptus Plantation (1/2)

- National Forest Policy 1988 mandated reduction of pressure on forests for fuelwood, fodder and industrial raw material requirement, through plantations under farm forestry and social forestry initiatives.

- To meet growing wood / biomass requirement, State Forest Departments, Forest Development and Plantation Corporations and Pulp & Paper Industry joined hands with the farmers, leading to creation of a sustained wood resource base of more than 3 million hectares of plantations under agro / farm forestry, 70% of which is Eucalyptus plantation.

- This could be made possible by massive investment of resources by the industry and the Corporations in terms of genetic improvement and development of highly productive and disease resistant clones, which increased plantation productivity by more than 400%, making these extremely viable in terms of competitive crops / land use.

Background: Eucalyptus Plantation (2/2)

- Multiplication of clonal plants to raise agro / forestry plantation is done with root trainer technology, which promotes lateral root system (versus tap root system of seed based plants), to enable root system to go only up to 1.5-2.0 metre soil depth.

- With clones, rotation of Eucalyptus plantation (1 main + 2 coppice crops) has reduced to 10-12 years versus 20-25 years earlier, which also helps in reduced depth of the root system. This is evidenced by easy uprooting of trees / plantation by the farmers when they decide to shift to alternate crops.

- Clonal Eucalyptus plantation has its root system far above the ground water level; and is a surface feeder for water and nutrient requirement.

Eucalyptus Plantation: Socio-Economic and Environmental Impact (1/2)

- Eucalyptus was introduced in India in later part of the 18th century, and is currently estimated to be grown in over 3 million hectares, ~80% of which is under agro / farm forestry. India has ~10% of the world's Eucalyptus plantation.

- As per the Food & Agriculture Organisation (FAO) Report (FP/48/E) 2014, around 93% of industrial wood requirement in the country is met out of agro / farm forestry plantations (~70% is Eucalyptus). And, it has benefitted the farmers and the industry, and has substantially reduced pressure on forests.

- As per the Centre for Science & Environment (CSE) Report, 2017 (titled "The Puzzle of Forest Productivity"), Eucalyptus plantations yield more net income/hectare/annum to farmers than almost 60-70% of the agriculture crops, and can play a major role in increasing future farm level income, on the back of new productive clones under development by the industry.

- Every year around 150,000 hectares of Eucalyptus plantation is raised in India, creating an employment of around 70 million man-days in rural areas.

Eucalyptus Plantation: Socio-Economic and Environmental Impact (2/2)

- National Green Tribunal (NGT) in its Order dated 20th July 2015 in Original Application No. 9 of 2014, in para 31 clearly stated that based on studies (in Annexure) conducted in different countries, growing of Eucalyptus, one of the major farm forestry species, has no adverse environmental impact nor is it disastrous for water table, as it consumes less water per kg of biomass generated versus many tree and agricultural crops (para 29).

Plant	Water Use Per Total Biomass (Litres / Kg)
Cotton / Coffee / Bananas	3,200
Pongomia (T)	2,600
Sunflower	2,400
Field Pea	2,000
Paddy Rice	2,000
Horse Bean	1,714
Cow Pea	1,667
Conifers (T)	1,538

Plant	Water Use Per Total Biomass (Litres / Kg)
Dalbergia (T)	1,483
Soybean	1,430
Acacia	1,323
Syzygium	1,017
Potato	1,000
Sorghum	1,000
Albizia (T)	967
Eucalyptus (T)	785
Finger Millet	592

Eucalyptus Plantation: Recent Developments

- Order dated 23rd February 2017 of the Government of Karnataka has banned growing of Eucalyptus plantations in private land in the State, including the plantations under agro / farm forestry, quoting selective references. Under pressure of ill-informed people, similar move has been started in the States of Kerala and Tamil Nadu.

- These actions would have severe social, economic, industrial and environmental consequences and would also go against the objectives of the National Forest Policy, 1988, as well as the National Agroforestry Policy, 2014, which aim to promote agro / farm forestry to meet the ever increasing demand for timber, food, fuel, fodder, and fibre.

IPMA Suggestion

IPMA suggests larger public, academia, institutions, media and policy makers to go through attached studies, to dispel the misconceptions about Eucalyptus plantation.

Annexure I:
Water Consumption: Root Structure

One of the most authoritative studies on Eucalyptus is by J. Davidson, published by FAO (1985), titled "Setting aside the idea that Eucalyptus are always bad", which has stated that:

- Species of Eucalyptus planted in India, *'Eucalyptus tereticornis'** has a root depth of 3m.
- It, therefore, uses rain fed soil moisture from the upper soil profile.
- Most Eucalyptus (species) root systems are more specifically adapted to using rainfed soil moisture from the upper soil profile, rather than from the groundwater table at considerable depth.
- Eucalyptus plantation in study area supported more luxuriant undergrowth and had a greater species diversity than the same in Sal plantation.

*non-clonal / seed based

Annexure II: Water Consumption

Francis, H. Raj, N.C.M. Rajan, K. Rajagopal and H.N. Mathur, belonging to the prestigious Forest Research Institute (FRI), Dehradun, in their article titled “Some Hydrological Investigations on Blue Gum at Osmund (Nilgiris)” (1980):

- Eucalyptus (blue gum) is not a water intensive species and does not drain waterlogged areas, as indicated by plantations raised in such areas in UP.
- Eucalyptus does not play any significant role in the depletion of water table and the criticism is not based on scientific facts.
- Study did not reveal any adverse effect of blue gum on the hydrological cycles in the Nilgiris.
- Local ground water and soil moisture regime and water quality in Nilgiris have not been upset adversely due to blue gum planting.

Annexure III: Water Consumption

Dr. Dinesh Kumar, a well-known scientist at the Indian Agricultural Research Institute (IARI), New Delhi, in his paper titled “Place of Eucalyptus in Indian Agro Forestry Systems” in the book on “Eucalypts in India- Past, Present and Future, 1986, states that:

- Eucalyptus is a xerophytic specie, i.e. plant adapted to life in a dry or physiologically dry habitat by means of mechanism to prevent water loss and as such has low rates of transpiration.
- Further, in the low water availability areas, Eucalyptus has ability to close up its leaves in such a way that it’s evaporation transpiration process is dramatically reduced.
- It may be noted that when it does not rain and the other trees turn yellow and parched, Eucalyptus stays green not because it has enormous reserves of water which is hoarded, but because it shuts off the stomas, and does not allow the water to escape through them.
- In other words, Eucalyptus does not lose as much water by way of transpiration as other trees.

Annexure IV: Water Consumption

In a study done by R.M. Singhal, B.C. Ramola and S.P. Pant (1986) at the Forest Research Institute (FRI), Dehradun, on Effect of Eucalyptus plantation on ground water table, it was concluded that:

- The tap root of Eucalyptus (where it exists) is not a major absorber of water from the water table in the low lying area.
- Thus establishing the fact that the roots of Eucalyptus do not grow enough to tap the ground water table and therefore, the tree does not absorb more water than is actually available on the surface soil, akin to any other dry deciduous tree.

Annexure V: Environmental Impact

Report published by Vinayakrao Patil, an eminent forest scientist, titled “Local Communities and Eucalyptus - An Experience in India” (1995) mentions:

- Co-operative agro forestry, and specially Eucalyptus plantations, can be used as an effective medium to fight the battle against environmental degradation. By meeting the needs of the people for small timber and domestic energy locally, pressure on national forests will be relieved considerably.

- The Report further goes on to ‘dispel the myths and misconceptions about Eucalyptus’ and states among other things that:

  - Eucalyptus does not compete for ground water and other nutrients with crops in its vicinity,
  - Eucalyptus does not need plenty of water and does not drain away subsoil water,
  - Eucalyptus does not cause degradation of land and does not hamper soil fertility.