

A conceptual analysis on the proposal on re-induction of forest growth in the North-western region of Batticaloa district, Sri Lanka

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Abstract — In recent past, abundant forest covers of Batticaloa district of Sri Lanka especially in the north-western region of the district have been destructed due to various reasons, which led to emergence of lesser reproductive grassland ecosystem. With an advent of recent efforts by the government to develop east, there is an urgent need to re-induce the forest growth in these grassland areas to replenish the dynamic equilibrium of nature and the interfaces between human societies. Considering this pronounced 'need', this paper lays out a methodology to re-induce forest growth in that region. What is proposed is an eco-friendly and sustainable method which uses livestock power as voracious grazers to remove the grasses, and allows free space for emergence. Once the seedlings reach certain height they start to shade the remaining grasses beneath them and retards further establishment of grass as such, the forest starts to develop densely. This method of re-induction of forest trees using traditional livelihood method, for which the region is famous for, i.e. livestock farming, is expected to produce significant national-wide benefits.

Index Terms — Ecosystem, farming, forest, grassland, grazing, livestock, rangeland, reforestation.

1 INTRODUCTION

Batticaloa is the center-most district in eastern province of Sri Lanka and it covers about 3% of the total land surface of the island. In early days prior to the present times of socio-political instability, it was a district endowed with an evergreen and flourished nature, with unopened (virgin) forests in the inland and dense mangrove forest vegetation surrounding the lagoon. Traditionally, the main livelihood of the people of this district has been paddy cultivation and livestock farming. These had been disturbed due to civil unrest in parallel to war related environmental damages to the forest cover. The estimated forest cover of Batticaloa was 56,807ha in 1992. But it is estimated that only about 30,000ha remains forested according to Forest Department sources. Moreover, the present day was situation coupled with illicit land-cover clearing for various development purposes have lessened the forest cover to a much higher extent than the above mentioned estimates.

The benefits enjoyed from natural forests cover are immense in an ecological perspective which is important to all living organisms in the region such as shading & humidity maintenance, hydrological cycle activation, soil structure maintenance, runoff regulation, soil erosion prevention, etc. Also it increase the soil fertility with the presence of plants, provide habitat for wildlife and maintain indigenous species by supplying suitable climate to survival, food, habitat and breeding places, and much more.

But in recent past, the forest cover abundance in the region has been depleted due to security reasons aroused from war situation. And, aftermath consequences from this deforesta-

tion are countless, such as (a) changes in regional micro-climate; which results in high local temperature during drought season, (b) loss of biodiversity, (c) loss of indigenous floral & faunal species, and (d) decline in overall other benefits. Most of the forest cover in the region was destroyed by continuous burning and which led to the conversion of productive forest areas into grasslands (which are less productive). This phenomenon is prominent especially in north-westerly region of district between Valaichchenai and Welikanda, where forest cover was fragmented and converted to grasslands due to continuous burning activities.

With an advent to Sri Lankan government's mandate to develop east, and, re-populate the deserted areas in Batticaloa district, the need to revive natural resources such as depleted forests and enhance eco-friendly livelihood activities (that has been practiced in district traditionally) become immense. As such, there is an urgent need to re-induce forest growth in these once-forested grasslands in the region. This paper provides a concept as to how an eco-friendly and non-polluting *multifaceted* methodology focusing on the sustainable development function as its core aim can be implemented in-lieu of this need.

In this paper it is proposed as per established facts based on large scale continental level experiment performed in the rangelands of the African continent by [1], who established that livestock farming (i.e. free roaming, rangeland farming) can be used as a mechanism to induce ecosystem change in the African grasslands to make them (eventually) evolve into woodlands. Moreover, the prescription of a methodology also adhering to the principles of sustainable development and eco-metabolism in a multifaceted developmental perspective can very well be considered as the novel aspect presented in this concept paper.

The once forested lands in Batticaloa can be re-vegetated using the using natural or anthropogenic means. One of the

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plausible and most sustainable options to regenerate this area is to induce forest growth in this grassland via allowing livestock grazing for some period of time and, then re-vegetate this pasture lands with proper forest vegetation. This proposed methodology is based on the literature by [1]. This long-term transformation is possible in the area where, the climatic condition is between the semi-arid and semi-humid.

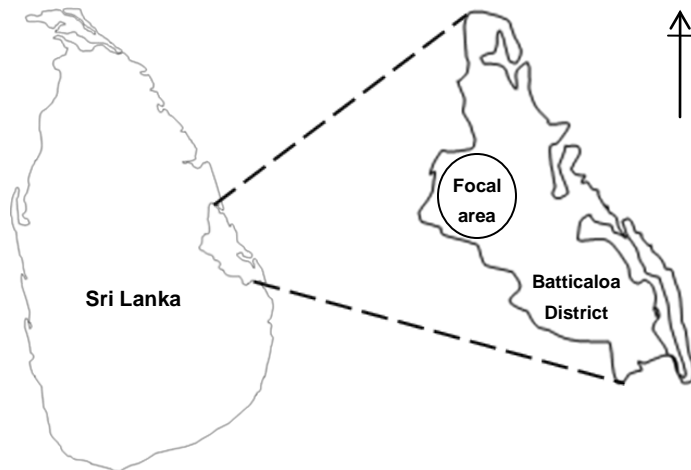


Fig 1: Sketch of focal research area within the context of Batticaloa and Sri Lanka (not drawn to scale)

As stated previously, due to the unavoidable circumstances the forests of North-Western part (see Fig. 1) of Batticaloa had been burnt severely in the past to assure the security in the particular area.

It was found important to restore the forest in that particular dry zone area in order to reduce the climatic change and to increase the locality's toleration limits to the adverse climatic changes, so as to facilitate for sustainable development. As such to achieve this, there is a need to increase forest cover. So a need arose to restore the forest in these previously forested grassland areas, in order to allow for the performance of the common ecological functions in the natural environment. Whilst the northwestern parts of Batticaloa district are being repopulated by re-housing schemes for displaced people, at the current situation there is no any forestation project that is being implemented.

After analyzing the studies related to the problem of concern, it is concluded that most sustainable means to induce the forest regrowth in the forest burnt areas of Batticaloa is by using livestock farming as the (driving) mechanism. Hence, this concept paper is presented as proposal on a mechanism that is suitable for the conditions of region to re-induce forest in its original areas.

The primary aim in the conversion of grasslands, which are created by anthropogenic activities such as burning of woody trees into full-fledge forest using locally available livestock such as cattle herd in an eco-friendly and effective manner. Consequently, the objectives can be stated as:

1. Increase the employment and as such, induce changes in the lifestyle of the focal region's people by introducing cattle farming as an income gener-

ative activity,

2. Induce livestock farming which is a major livelihood in that area as a sustainable industry at a large scale,
3. Increase the economic efficiency of that particular area, and,
4. Maintain the venue to ensure a dynamic equilibrium of the locality's natural environment and through this - provide a livable climatic condition.

2 METHODOLOGY

As it is a proposed idea, the recommendations by previous studies on the subject which was carried out by [1] for a similar situation in Africa is incorporated. Original findings had contributed to the formulation of a methodology (presented in Fig. 2) for re-vegetating Batticaloa with forest. The results of this analysis yielded a strategic framework that can be implemented to re-induce forest in the focal area. This framework has consequently been prepared based on scientific-logical reasoning and the standard scientific approach to explain why this process is applicable to this region.

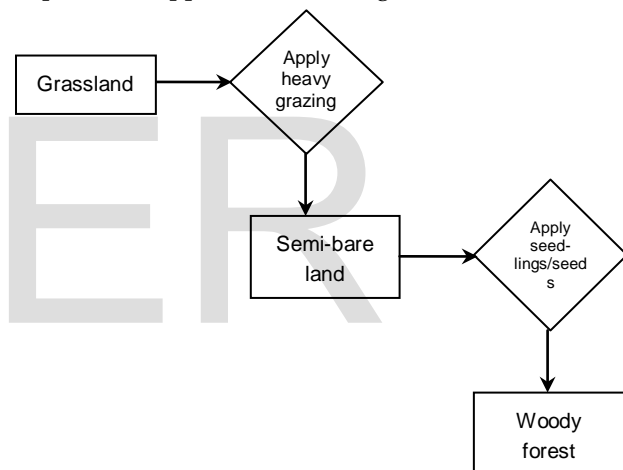


Fig 2: Schematic process of the proposed re-induction mechanism for afforestation

As [1] had identified the focal area is situated in an interfacial area between semi-arid to semi-humid climatic regions and as such (according to his findings), the climatic condition of the focal area is suitable to implement the re-vegetation mechanism that this paper prescribed.

It should be noted that the prescribed mechanism use livestock as a main part. As it is mentioned earlier, livestock farming is a major livelihood for the people in the focal area. Therefore, collecting or applying livestock to do grazing on the study area (at current with grassland) is not so difficult process. As [2] mentioned, heavy grazing of livestock in the grassland converts into bush/wood land naturally and this conversion is supported by the weather condition of that area (in these regard it is possible to put forward the established fact that: 'as per Inter-governmental Panel for Climatic Change's (IPCC) estimates the eastern province of Sri Lanka

will get 20% more wetter due to global climate change' - in support to this argument). Moreover, there is a correlation between rainfall and grazing pressure in the process of conversion of grassland to woody growth. The biomass of grassland will decrease and the woody cover increase with greater grazing pressure [3].

Also it is prescribed to sow seeds of different forest trees and with the efficient interaction of legumes. It is because, if land is allowed to recover as forest by only applying grazing pressure, it may become a mono-species wood growth and this will results in a reduction in biodiversity of area [4].

It should be noted that the suggested mechanism initially uses the cattle herd to the grassland. As cattle start to graze the grass and suppress its growth - the next strategy should be implemented. This is to be executed by planting the tree species' seed or seedlings to enable growth and establishment of forested land. Consequently as tree growth rates increase - the grass growth rate is being decreased by the strategic/controlled application of grazing pressure. Ultimately grass-ecosystem is being converted into a stable forest-ecosystem.

The next possible question along the line of sustainable development could be, 'what is to happen with the livestock once the forestland is established?'. As for a feedback of this mechanism, an alternate feed supply for the livestock requires research. On the other hand, sustainable harvesting of fodder from leguminous tree species in the established forest stands can also be prescribed as a suitable alternative to overcome this 'feed crisis'.

3 CRITICAL ANALYSIS

The vegetation loss takes place with the forest fire and if the system left undisturbed, the grasses and large trees gradually start to grow again if growth of grasses is higher than that of forest trees (Fig. 3).

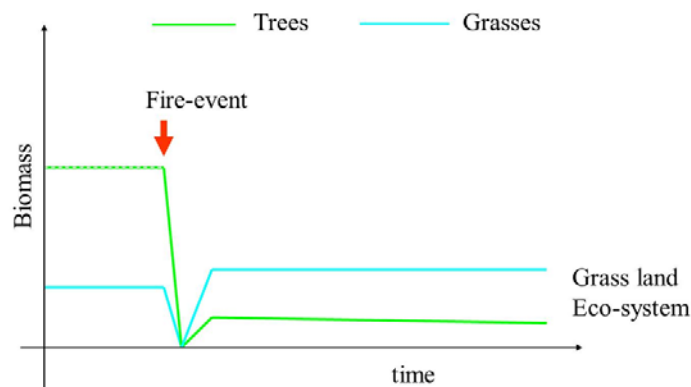


Fig 3: Biomass vs time relationship during anthropogenically induced forest destruction, leading to emergence of grassland ecosystem

Grass develops quickly and starts to shade the woody plants thus retards the growth of trees. And re-burning con-

tinued in the region finally ended up in grassland as major ecosystem [5]. As prescribed in methodology, the proposed main characteristic of livestock, i.e. grazing habit, utilized to convert the grassland into forest ecosystem. As such it is possible to induce the forest growth by suppressing the grass growth by applying heavy grazing pressure (Fig. 4).

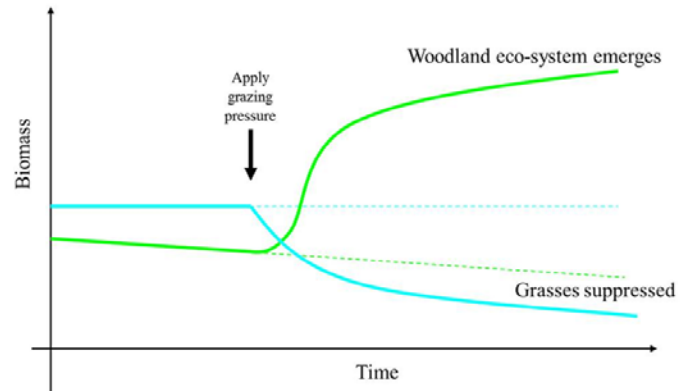


Figure 3: Biomass vs time relationship during anthropogenically induced forest destruction, leading to emergence of grassland ecosystem

The grazing pressure might get intense (and could have negative impacts) if we allow them to overgraze. So controlled and carefully managed overgrazing reduces the grass growth and creates space for wood tree growth. This should be done for 3/4 times until the grass community suppressed. Relatively heavy grazing converts the grassland into bush land naturally and it is being supported by the local weather conditions as stated by [2]. Wood tree re-growth in the grassland is an environmentally acceptable mechanism to reduce the effects of soil erosion. In addition to this it would supply fuel wood and support for high carbon sequestration [1]. These will help to maintain natural environment in a highly stable and dynamic state.

Having established how forests can be revived through the induction by overgrazing, it is possible to critically analyze the actual practicalities and constrain in implementing the proposed methodology. In this regard, there is a need to find out the desirable characteristics of livestock that can be used successfully in this mechanism, i.e. they have to be voracious grazers and be of hardy stock and should efficiently use the existing grass type. Proper and correct selection of livestock determines the success.

It is also to be noted that the grazing pressure reduce the competition for the remaining underground propagules of forest burnt trees. Furthermore, usage of livestock leaves excreta which helps improving soil fertility. Feecal matter excreted to the soil being acidic in nature, helps recover soil pH, as burning activity led the soil to alkaline nature.

Grass biomass and total vegetation cover responds interactively with rainfall and grazing pressure. Based on the field trials by [3] proved that grasses decreased and the woody annuals increased with increasing grazing pressure.

The overall community participation, financial allocation with the co-operative activities and efforts of Forest Depart-

ment are essential to lead the process successfully. A system which is built on local knowledge and traditions to work in partnership with local people on local problems [6] – will be the best model to implement this proposal.

4 CONCLUSION & RECOMMENDATIONS

As expected it is proposed and recommended to use the livestock farming as a mechanism to re-induce forest growth in forest burnt areas considering the benefits to the environment. The proposed strategy can be administered using the sequential steps indicated in the methodology justified for its effectiveness. The prescribed strategy was assumingly effective and appropriate for large rangelands where there is no control of human activities.

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