

The Traditional Ecological Knowledge of Soliga Tribe on Eradication of *Lantana Camara* and their Livelihood Through Mahatma Gandhi National Rural Employment Guarantee Act at Biligiri Rangaswamy Temple Wildlife Sanctuary, South India

Madegowda C.¹ and C. Usha Rao²

Abstract

The Lantana camara weed is wildly spreading in Biligiri Rangaswamy Temple Wildlife Sanctuary and it has made a negative impact on animals and plant species, because these animals are facing food insecurity. The Soliga tribals livelihood depends on the forest for Non-timber forest products and the daily consumption of items like tubers, leaves, fruits, mushrooms etc. Lantana weed can be controlled through removing the Lantana weed in the same places of the forest for a minimum of five years and they observed that native species are growing back where the Lantana was removed. It helps both, the biodiversity conservation as well as the livelihood of the Soligas. The Lantana camara can be removed under the scheme of the Mahatma Gandhi National Rural Employment Guarantee Act.

Introduction

The *Lantana camara* weed distributed in most of the BTR Wildlife Sanctuary areas. The *Lantana camara* is an invasive species like a weed. *Lantana camara* is a much-branched thicket forming shrub originating in the tropics and subtropics of America. Since its introduction and distribution as an ornamental plant in the 1840s, *Lantana* has spread and infested 4 million hectares (Thorp, 2001). *Lantana camara* spread all over India as well as in Biligiri Rangaswamy Temple (hereafter BRT) wildlife sanctuary. *Lantana camara* increased dramatically from 1997 to 2008. This was accompanied by a change in native community structure. Species richness, diversity and evenness declined significantly in some forest types, and at landscape scale. There were also changes in the population structure of native tree species, with reductions in the density of tree saplings, possibly due to competition with *Lantana camara* (Sundaram et al 2011). While in scrub forests the stem density was highest in *Lantana camara*. Similarly, in the *Lantana camara* infested plots in the shola forests stem density was higher. The total number of species was highest in plots of *L. camara* and infested plots in deciduous and scrub forests, while it is lowest in evergreen forests (Murali et al, 2001). In the dry deciduous forest of India *L. camara* alters the spatial pattern of herbaceous layer vegetation and also changes the microhabitat conditions which could probably help towards its successful proliferation (Sharma and Raghubanshi, 2011).

Lantana camara poses a threat to local flora. The number, density and frequency and overall health of species were remarkably poor in invaded areas (Dobhal et al, 2011) the total number of species decreased with increasing *Lantana* cover (Sharma et al, 2007). The entire landscape is being changed by this invasive species, affecting vegetation, animals and human livelihoods alike. One experimental solution is that the Soliga use the plant in their woodcraft. However, once the resilience of a system has been breached, it is very difficult to return it to its original state: it might have crossed a threshold that cannot be reclosed (Heneghan, 2012). The diversity of forest vegetation such as native herbs and shrubs, tree seedlings and grass, is clearly reduced by *Lantana*. It is also reducing the richness of native understory species while also causing compositional changes in the herbs and shrubs. The native species have slowly decreased and there is no fodder for wild animals.

The National Rural Employment Guarantee Act 2005 (here after NREGA) was enacted by legislation

1 Dr. Madegowda.C, Senior Research Associate, Ashoka Trust for Research in Ecology and the Environment (ATREE), Bangalore, Karnataka, India. Email: cmade@atree.org and cmadegowda@gmail.com

2 Dr. C. Usha Rao, Associate Professor, Department of Studies in Social Work, University of Mysore, Mysore, Karnataka, India. Email: drcusharao@radiffmail.com

on August 25, 2005. The NREGA was renamed as the Mahatma Gandhi National Rural Employment Guarantee Act (hereafter MGNREGA) on 2 October 2009. MGNREGA aims at enhancing the livelihood security of people in rural areas by guaranteeing hundred days of wage-employment in a financial year to a rural household who volunteer to do unskilled manual work. (MGNREGA, website). The studies are mentioning that 53.73 percent of the rural Indian households and 67.95 percent of the rural households below poverty line (BPL) reside in these 119 districts. This distribution pattern of districts in terms of rural BPL households evidently reflects the intentions of the NREGA to attack the poverty stricken regions of the country first (Chakraborty, 2007). The goal of NREGA is to empower the socially disadvantaged, especially women, scheduled castes and scheduled tribes, through the processes of a rights-based legislation (Shah, 2012). The contentious issue for agriculturists is not the minimum wages paid in NREGA as generally believed, but that women who are the backbone for agricultural work and were paid very low wages are now getting equal and minimum wages in NREGA (Gopal, 2008).

The Soliga tribes have been living in B.R. Hills of Biligiri Rangaswamy Temple (hereafter BRT) Wildlife Sanctuary, Chamarajanagar district, Karnataka for centuries. The Soligas belong to a gatherers community. Later on Soligas started agriculture activities in the forest, which is known as shifting cultivation and collecting non-timber forest products, which were marketed to Large Scale Adivasi Multipurpose Cooperative Societies (hereafter LAMPS). The LAMPS started in B.R. Hills, Chamarajanagar and Hanur in 1982 and provided the wages to Soligas collectors. NTFPs provide 58 percent of income (Madegowda, 2002) and nearly 50-60 percent of their income is earned through the collection of NTFPs (Hegde *et al.*, 1996). Typical NTFPs are honey, lichen, Amla broomsticks etc. The NTFPs collection was banned in 2004 under the Wildlife Protection Act of 1972 by the Forest department and strictly stopped during 2006. After the NTFPs ban the government did not provide any alternative employment opportunities to the Soligas. There were around 16500 Soliga tribal people who depended on the NTFPs collection from three LAMPS. Due to this ban Soligas migrated to Tamil Nadu, Kerala, Kodagu and other districts for employment and Soligas faced livelihood insecurity. Some of the Soliga families got employment under the MGNREGA in 2009 and 2011.

The Soligas were approached by the Forest Department and district administrative authority of Chamarajanagar for employment under the MGNREGA because of Non-timber forest Products (hereafter NTFPs) collection was banned by the forest department and government did not provide any alternative employment to Soligas and the native species decreasing and wildlife are facing the fodder problems due to the Lantana camara spread and in the BRT Wildlife Sanctuary and it also effect the livelihood of the Soliga. Soligas discussed the issues of lantana removal in BRT Wildlife Sanctuary with the Deputy Conservator of Forests. The Forest Department permitted the Soligas to remove the Lantana under the MGNREGA in 2009 and again in 2011 provided opportunities in two ways: on one hand providing employment to Soliga tribes and on the other hand helping with the forest conservation.

Methodology

Study Area. We conducted this study in B.R. Hills located in the BRT Wildlife Sanctuary of Chamarajanagar district, Karnataka State, India. B.R.Hills is located in the middle of the bridge between Western Ghats and Eastern Ghats in south India. A BRT Wildlife Sanctuary area spreads over 574.82 sq kms and is located between 77°-77° 16'E and 11° 47' -12°09'N. The BRT wildlife sanctuary has a diversity of forests from scrub forest, deciduous, moist deciduous forest, semi evergreen, ever green, shola and grass land. The BRT Wildlife Sanctuary is rich in flora and fauna. The BRT Wildlife Sanctuary was declared as a Tiger Reserve in 2011. The Soliga tribes have been living in the B.R. Hills for centuries, collecting NTFPs, which were sold through the LAMPS societies. They also use different types of produce for consumption, like tubers, leaves, fruits, seeds bamboo shoots, mushrooms etc. There are 61 Podu situated inside as well as in the periphery of the BRT Wildlife Sanctuary area.

Data collection. We used an interview scheduled to gather information on various aspects of MGNREGA scheme and Lantana problems in the forest. A random sampling method was used for the study. A total of 85 Soligas from Yarakana gadde colony, Seege betta Podu, Kalyani Podu and Manjigundi Podu were engaged in lantana camara removing work in 2011 under MGNREGA in B.R. Hills. Out of 85 Soligas 30 per cent of 35 respondents were chosen for the study. The interview was conducted in 2011. The information was collected from different age levels of respondents asking open ended and closed ended questions. The MGNREGA scheme related questions ranged from number of days of employment, wages per day, how many members required employment under the MGNREGA scheme, sources of information to expected activities for

Podu development etc. The questions furthermore included forest and Lantana camara problems to biodiversity, wild animals and native species, lantana when it increased in the forest, the methods to control the lantana, the current methods to remove the lantana under the MGNREGA scheme and how many years lantana has to be removed from the forest in the same places, what native species are growing after removing the lantana, how do wild animals, birds, insects benefit. What are the future activities that need to be carried out to remove the lantana in the long term and to conserve the biodiversity through involving the Soliga tribes in the forest conservation and using their ecological knowledge; we gathered all the information on forest changes and lantana weeds and livelihood of the Soligas.

Results

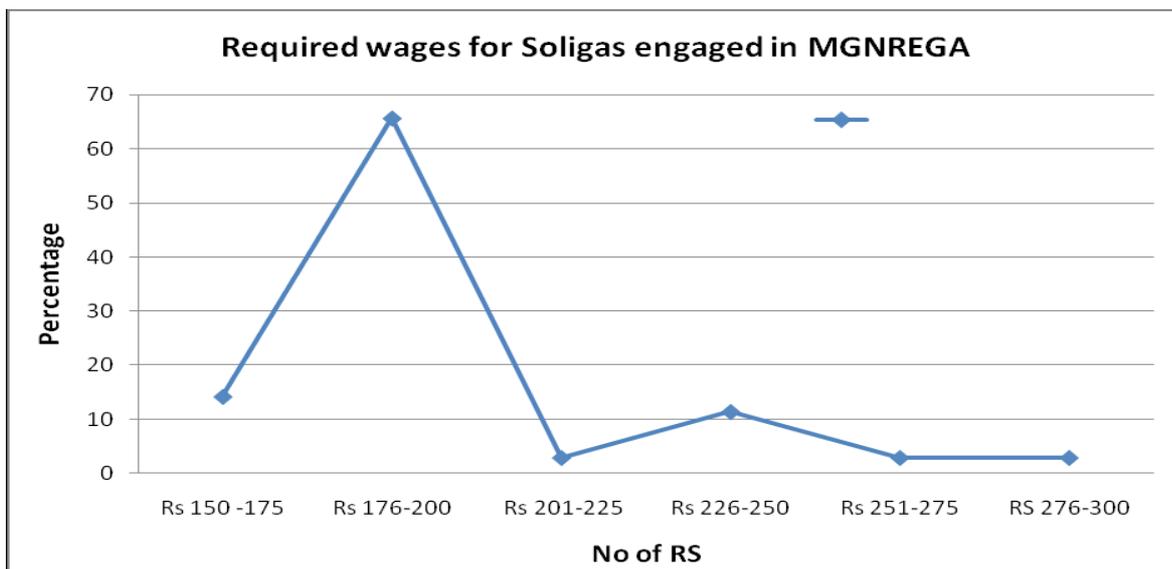
Knowledge on Mahatma Gandhi National Rural Employment Guarantee Act 2005. The MGNREGA provided employment to Soligas in 2009 and again in 2011. All the 35 respondents mentioned that MGNREGA is a very useful programme. It provides employment and stopped the migration among the Soligas in B.R. Hills. They were happy that they are getting employment and it was helpful as most of the Soligas are landless and few families own the land that is a minimum of ½ acre to one acre. They worked in their agricultural land for four months and in the remaining months engaged in NTFPs collection and worked as daily wage labourers.

Table 1: Sources of information

Sl.No.	Sources of information	No. of respondents (%)
1	Podu leaders	18 (51.5)
2	Grama Panchayathi members	10 (28.5)
3	Forest officials	05 (14.3)
4	Grama Panchayathi and other officials	02 (05.7)
Total		35 (100)

The above table No. 1 shows that, the sources of information received by Soligas on MGNREGA: 51.5 per cent of respondents received the information from their Podu leader (Podu means Village or hamlet). 28.5 per cent of respondents received the information from Grama Panchyaathi members. However the majority of the information was gathered from Podu leaders and Grama Panchayathi members. This was very useful and it effectively reached more people when compared to others .So that Government officials should provide more information on MGNREGA information in the future to Soligas.

Graph 1: Required wages for Soligas engaged in MGNREGA

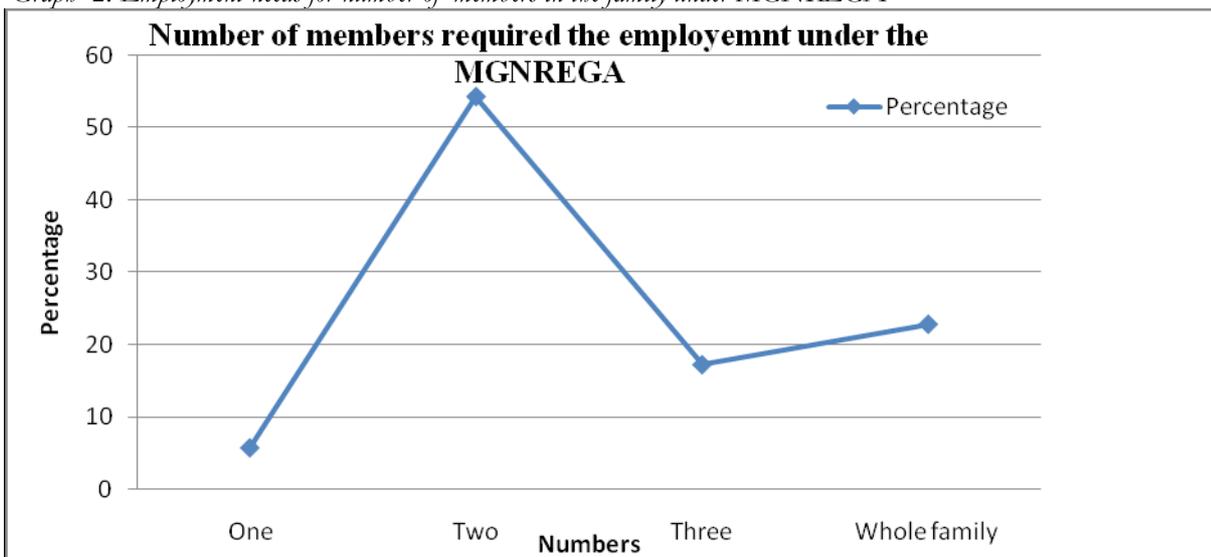


Required wages for Soligas engaged in MGNREGA Scheme. Most of all the respondents mentioned that the wages provided currently under the MGNREGA in Karnataka were not sufficient to lead the family life because the rates for food items have become expensive. Hence there is a need to increase the existing wage rates from Rs 125 per person. The graph explains the expected wages per day under the MGNREGA.

The graphs No. 1 shows that 65.7 per cent of respondents mentioned that the wages under the MGNREGA should be increased up to Rs 176 to Rs 200 per day per person. 14.2 per cent of respondents said that wages should be increased to Rs 150 to Rs 175 per person per day and 11.4 per cent of respondents mention the wages should be increase to Rs 226 to 250 per person per day and other opinions are negligible. The current daily wages provided under the MGNREGA are not sufficient in order to buy all the food items and daily use items, therefore the government needs to increase the wages to at least Rs 200 per day per person.

Employment needs for number of members in the family under MGNREGA Scheme. The current MGNREGA scheme provides employment for one person in the family for 100 days in a year. Most of the Soliga tribals are landless and they depend on NTFPs collection and daily wage earnings. Few families have small landholdings and depend on rain for agriculture to get one crop per year. This is not sufficient to lead a family life, so they have to find other sources of income like daily wage labour and NTFPs collection in the forest. The graph below shows the numbers of family members who are required to be employed under the MGNREGA according to the Soligas and their needs for employment.

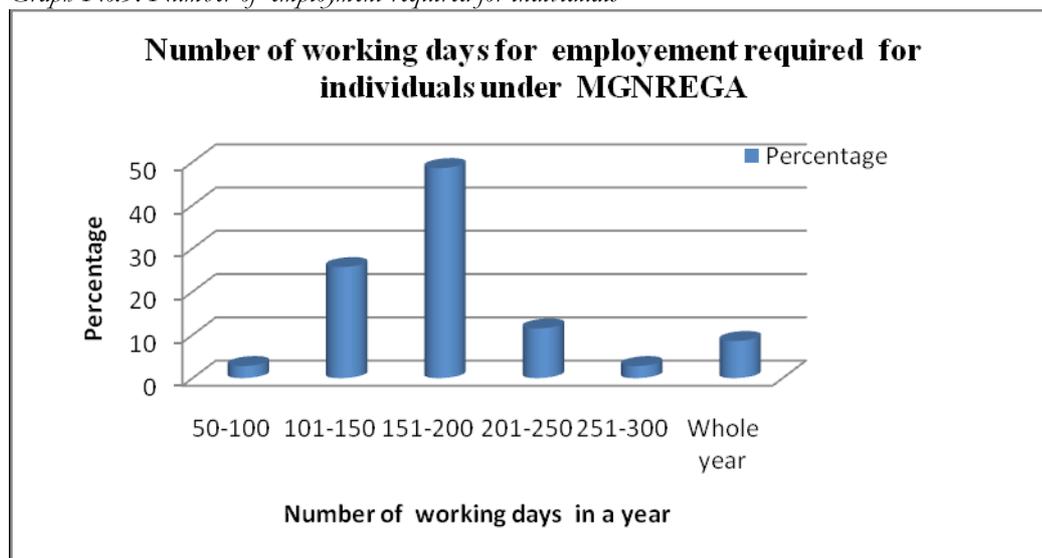
Graph 2: *Employment needs for number of members in the family under MGNREGA*



The graph 2 shows that Soligas suggest that employment should be guaranteed for more than one person in the family. 54.3 per cent of respondents mention that two persons per family should get the employment. 22.8 per cent of respondents' opinion is that everyone in the family should get the employment. Whereas 17.3 per cent of respondents opinions related to three people in family should get employment under the MGNREGA scheme and only. Most of the Soligas are landless families, who are depending on NTFPs, daily wage labours. The Government needs to provide the employment to at least two persons in the family in a year. This will help the Soligas livelihood.

Opinion on number of working days under the MGNREGA scheme. Presently MGNREGA provides employment for 100 days per family per year. The respondents feel that the number of days should be increased in MGNREGA scheme. Only 100 days of daily wage earning is not sufficient to lead a family life hence there is a need to increase the number of working days in a year. The graph shows that the number of days of employment required for the Soligas family in a year.

Graph No.3: Number of employment required for individuals



The graph 3 shows that 48.6 per cent of respondents mention that their employment needs are 151 to 200 working days per year and this is the highest response we got from the respondents. 25.7 per cent mention that 101 to 150 days are sufficient. The current 100 days of employment are not sufficient to lead a family's life; therefore the government needs to increase the number of working days to at least 200 days per family per year, which will help the Soligas engage in employment under the MGNREGA scheme and income.

Tribal development activities for Soliga tribes under the MGNREGA scheme. The MGNREGA provides employment to Soligas and also provides opportunities to develop the village in different ways. In table 2 Soligas suggested the different types of Podu development activities carried out under the MGNREGA.

Table 2: Tribal development activities for Soliga Tribes under the MGNREGA

Sl.No.	Types of development	No. of respondents (%)
1	Land development (agriculture)	21 (60.0)
2	Village infrastructure development	06 (17.1)
3	Water tank work nearby Podus	03 (08.6)
4	Elephant trench repair around the Podu	05 (14.3)
	Total	35 (100)

The table No. 2 shows the type of village development activities that should be carried out under MGNREGA scheme. 60 per cent of the respondents gave the opinion towards land development (agriculture and horticulture). 17.1 per cent of respondents mention Podu infrastructure development. This will help the Podu or village level development as well as providing employment to the Soligas. The government can carry out these types of activities to reduce to poverty among the Soliga.

Lantana Camara

Growth of Lantana in the forest. The lantana weed in BRT Wildlife Sanctuary areas started spreading 50 years ago and the native species started to slowly decrease. Due to this animals were facing lack of fodder. The Soligas also felt the loss of NTFPs, tubers, fruits, and green vegetables for their livelihood due to the growth of Lantana weed. The Soligas have a deep understanding and knowledge about the forest ecosystem. They observe each and every aspect of the forest changes. Due to the growth and spread of lantana weed, animals are migrating to nearby agriculture lands.

Table 3: *The growth of Lantana in the forest*

Sl.No.	No. of Years	No. of respondents (%)
1	20-30	24 (68.6)
2	31-40	07 (20.0)
3	41-50	02 (05.7)
4	50 years back	02 (05.7)
	Total	35 (100)

The table 3 shows the lantana spread in BRT wildlife sanctuary over the years. 68.6 per cent of respondents mentioned that lantana weed increased in last 20 to 30 years in the forest. 20 per cent of respondents said lantana has increased in last 31 to 40 years. The lantana has increased much more in the last 31 to 40 years and 20-30 years as mentioned by the respondents. Due to the invasion of this species the native flora has decreased. Now the lantana weed has slowly spread all over the forest areas and it has affected the wildlife and Soligas livelihood.

Methods adopted to control Lantana growth. The Soligas have in depth knowledge of the forest and they know the management of the forest in their own traditional ways. They have knowledge on the spread of lantana in the forest and also know the solutions to control the lantana. For the past two years few methods have been applied to remove lantana in BRT Wildlife Sanctuary by Soligas like, cutting the lantana, keeping the lantana weeds in different places, uprooting the lantana weeds and setting fire to lantana weeds when it is dried.

Table 4: *Methods adopted to control Lantana weed*

Sl.No.	No. of years	No. of respondents (%)
1	Three	05 (14.3)
2	Four	09 (25.7)
3	Five	12 (34.3)
4	Six	05 (14.5)
5	Seven	03 (08.6)
6	Eight	01 (02.8)
	Total	35 (100)

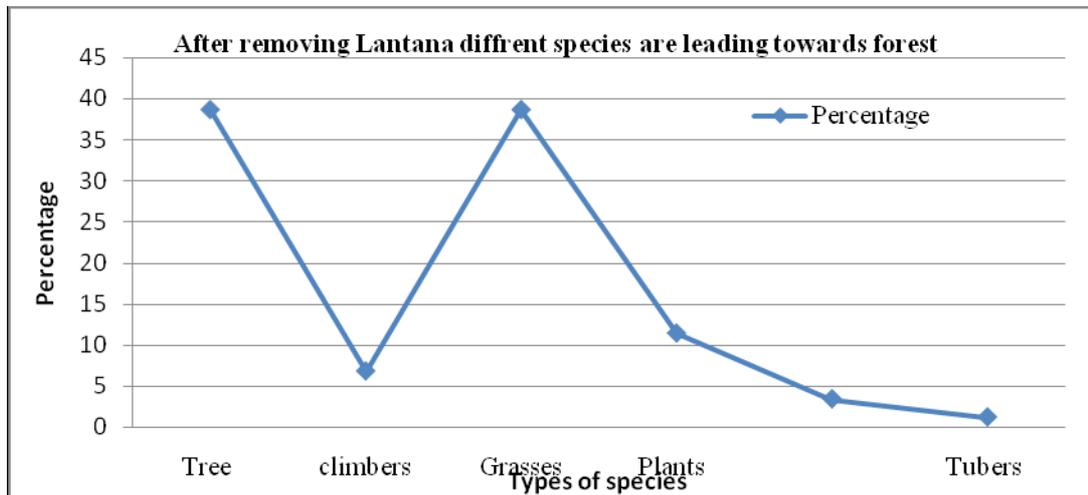
The table 4 shows how many years lantana has to be removed to control the spread in the forest. The majority of the respondents or Soligas suggested, that is 34.3 per cent of the opinions, that lantana has to be removed continuously for five years. 25.7 per cent of respondents said lantana has to be removed for four years continuously in the same place. 14.3 per cent of mention three and 14.5 per cent of respondent mentions six years.

To control further growth of lantana weeds it has to be removed at least four or five times continuously in the same place. This process will control the growth of Lantana spreading in the forest and it also helps in the growth of native species of plants in the same place.

Growth of different types of native species after removing Lantana

The Soligas mentioned after removing the lantana under the MGNREGA in the same forest area, the different types of native species are growing back in the forest. They also mention that it is helpful for wild animals, birds and the Soligas themselves. The table shows the natives' species growing in the forest after removing lantana weed as was observed by the Soligas.

Graph 4: Growth of different types of native species after removing Lantana



The graph 4 shows that 38.6 per cent of respondents mentioned that tree species have grown back and again 38.6 per cent of respondents opine the growth of different types of grass species has risen..

It is clear from the above graph that after the removal of lantana from the forest area under MGNREGA scheme, the native species of flora started growing again and wild animals are getting more fodder. This change would help the wild animals and birds to get sufficient fodder, namely sambar, deer, barking deer, elephant, bison and different kinds of birds. Furthermore it is helping the Soliga tribe to get more employment opportunities.

MGNREGA Future forest conservation activities and employment. Soligas have mentioned a number of activities to be carried out to conserve the forest and to enable the Soligas to a better livelihood under the MGNREGA. They are:

- 1) Removal of lantana weeds in all the forest areas
- 2) Removal of the lantana on the road sides
- 3) Removal of the lantana weeds on the trees
- 4) Removal of the lantana around the water tank
- 5) Removal of Lantana where there is no growth of tree and plant species
- 6) Planting grass
- 7) Planting Nelli (Amla) and Antuval (soap berry) plants in the places where lantana is removed
- 8) Making tank bunds to small springs to provide water for animals to grow fodder for animals
- 9) To make Boli or grass land in the lantana free areas Hulllu thotti (grass places)
- 10) To Uppilu (hemi parasite) from Nelli Amla)trees

Most of them mentioned that Lantana eradication and planting local plants (and thus automatically providing animal fodder) are related conservation activities that could be carried out under the MGNREGA scheme. This will help the native species to grow back in the forest and secure the livelihood of the Soligas in BRT Wildlife Sanctuary.

Discussion

Lantana camara use. The removed lantana weed sticks can be used for making furniture, this experimental activity was carried out in M.M. Hills of Karnataka by Ashoka Trust for Research in Ecology and the Environment (ATREE), Bangalore, involving the local Soliga tribal people and providing employment. This forest area belongs to the M.M. Hills reserve forest, so these types of activities can also be carried out in the BRT Wildlife Sanctuary. One of the ways to make effective use of these weeds is to utilize them as a source of energy (Kumar et al, 2009). Lantana stems have been used by other forest dependent communities in adjacent states to make baskets for over 100 years due to the decline in bamboo in these regions. A few artisans from

M.M. Hills were trained by tribals to make baskets out of Lantana in the neighboring state of Andhra Pradesh in 2003. After artisans were trained in the use of Lantana stems to build furniture, it was estimated that currently artisans are using less than 10% of the annual productivity of the lantana species (Bawa et al, 2007). The dried lantana is also used for firewood; raw sticks are used for hut walls and also for live fencing around their land and kitchen garden fencing. The forest department shall provide the opportunities to remove lantana and use the sticks for furniture making and marketing to outside communities. It helps the biodiversity conservation and also provides employment to the Soligas.

Lantana camara problems and solutions. The Lantana camara weed spread in most of the deciduous forests and it is also slowly spreading to evergreen forest, scrub forest and grass lands in BRT Wildlife Sanctuary. The wild animals are facing fodder insecurity and are migrating to agriculture lands for fodder. Soligas have also lost some of the consumption products like tubers, leaves, fruits, seeds and honey, who have decreased in the forest. Due to the lantana spread, the native species are decreasing in the forest. We can only find adult and aged tree species and smaller saplings are decreasing in BRT Wildlife Sanctuary. Due to its extremely invasive character lantana has strongly inhibited the regeneration of native species, medicinal plants, grasses, and wild tubers. Soligas see drastic changes as leading to a severe food crisis for the animals, which depend on these native species as a food source (Mandal et al, 2010). The entire landscape is being changed by this invasive species, affecting vegetation, animals and human livelihoods alike. One experimental solution is that the Soliga use the plant in their woodcraft. However, once the resilience of a system has been breached, it is very difficult to return it to its original state (Heneghan, 2012).

Lantana invasion in the forest was also leading to increased crop raiding by animals such as wild pigs (Sundaram et al, 2012). Recently, BRT has been invaded by lantana camara and this weed has spread to most forest areas. As a result, animals do not have enough grazing areas and they are therefore changing their food habits and shifting to other forest areas (Madegowda, 2009). Since the moist deciduous and dry deciduous forests at high altitude of BRT Wildlife Sanctuary are infested with lantana, both the blackbuck and the four-horned antelopes are restricted to the foot hills with open deciduous and scrub forests (Kumara et al, 2010). The recent environmental history of the area is described by all harvesters, who claimed 20 years ago, the forest was free from L. camara, at which time it was easy to see and move around in the forest and the microclimate was more favorable. They believe that L. Camara has replaced the former grass understory and that it now prevents the growth of tree saplings (Rist et al, 2010). Soligas mentioned that Lantana is spreading very fast in the forest and it affects the wild animals, native species, as well as the livelihood of the Soligas and they also said that in the future the whole BRT Wildlife Sanctuary ecosystem will change and the tiger and wild animals face more food and fodder problems. The government and forest department should take up some activities to remove the lantana weed in the forests using the MGNREGA scheme involving the local Soliga tribal people providing employment and involving them in the conservation, since they have in depth ecological knowledge on the forest changes over the years.

Traditional methods. The Soligas observed and mentioned that before 1974 the forest fires accrued every year and controlled the lantana weeds in the forest. But after the declaration of the Biligiri reserve forest into BRT Wildlife Sanctuary the forest fires were forbidden under the Wildlife Protection Act in 1972. The forest department stopped the forest fires and lantana distribution has increased in BRT Wildlife Sanctuary. The quantity of grass and bamboo had declined due to lantana invasion (Sundaram et al, 2012). Due to the lantana, native species are decreasing and vegetation structure has been changed over the years. The Soligas have in-depth ecological knowledge, and that knowledge can be used for biodiversity conservation. In total 88.6 per cent of Soligas mentioned that lantana growth has increased from 20 to 40 years back and changed the forest ecosystems. 60 per cent of Soligas said that lantana should be removed in one place continuously for up to four to five years to be able to control the lantana spreading to other areas.

Under the MGNREGA scheme Soligas were first cutting the lantana and keeping the lantana weed in different places, setting fire to lantana weed when it dried and uprooting the roots of the lantana weed. This method is currently practiced by the Soligas in BRT Wildlife Sanctuary. Older Soliga suggest that fires played a beneficial role and helped to control lantana, lantana and younger Soliga suggest that fires played a detrimental role and helped to spread lantana (Sundaram et al, 2012). Therefore the forest department should use the MGNREGA scheme to remove Lantana from the forest and conserve the biodiversity and also provide employment to local Soligas. The forest department and government implemented MGNREGA scheme only for

one year in 2007 and again in 2011. After lantana was removed, different types of native species have been growing back as was observed by the Soligas. 38.6% of Soligas mentioned that mostly tree species are growing back and the same number of Soligas said that different types of grasses are growing back and other types of species also growing in places where lantana has been removed, like climbers, plants, medicinal plants and tubers. The wild animals are getting more fodder, birds and insects are getting the food too and it increased the biodiversity in those areas.

They also said that lantana should first be removed in the Hulu thotti places (grass places) because it is spreading to the grass forest areas first, it this will help the wild animals getting more fodder. The removed lantana can be used for making furniture from the sticks. The forest department can encourage the tribal youths to get involved in furniture making activities even though this will only decrease lantana growth in a small quantity. Therefore the mass removal of lantana is very important under the MGNREGA scheme as it helps in biodiversity conservation and supporting the livelihoods of the local Soligas.

MGNREGA implementation. When the NTFPs collection was banned in 2004 by government in BRT Wildlife Sanctuary, the government did not provide an alternative employment to the Soligas. They were facing livelihood insecurity and they started migrating to the outside of the forest for other options of employment. Most of the tribals are landless and they depend on NTFP collection and wage labour for the whole year. In 2007 under the MGNREGA scheme Soligas got 100 days employments (MGNREGA website) per family per year, the same again in 2011. Between the years they did not get any employment through the scheme. This scheme is good opportunity to those people who depend on wage labour and rain fed agricultural and especially for Soliga tribals.

Conclusion

The MGNREGA scheme provides employment to Soligas and it also helps in the biodiversity conservation through removing lantana weed in BRT Wildlife Sanctuary. The awareness created by Podu leaders and Grama Panchyathi members has helped Soligas getting the information regarding the employment opportunities. This has lead the Soligas to demand employment, under the MGNREGA scheme, but now higher wages and higher numbers of working days are required for the Soligas because most of them are landless and they depend on rain fed agriculture. They are also aware of the ill effect of spread of Lantana weed and know the controlling methods which in turn will not only help them to get employment opportunities but also will help in the conservation of forest. This will definitely promote the growth of native species of plants and helps in growing fodder for the wild animals. The forest department should use the MGNREGA scheme to create more fodder for the wild animals through the removal of Lantana camara in the forest. This would help in conserving wild animals such as tigers, by providing a sufficient amount of prey species for them, which is a result when enough fodder plants are growing the forest.

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References

- Bharath Sundaram and Ankila J. Hiremat. (2011). *Lantana camara invasion in a heterogeneous landscape: patterns of spread and correlation with changes in native vegetation*, *Biological Invasions*. Published by Springer Science+Business Media B.V, pp 1-17.
- Bharath Sundaram, Siddhartha Krishnan, Ankila J. Hiremath and Gladwin Joseph. (2012). *Ecology and impacts of the Invasive Species, Lantana Camara, in a Social Ecological System in south India: Perspectives from Local Knowledge*. *Human Ecology*. An interdisciplinary Journal, published by Springer Science + Business Media New York, Volume 37,pp 2.
- Gopal. K.S. (2008). *Suggestions to Make NREGA to Work and Succeed, Civil Society Voices*.
- Gyan P. Sharma and Raghubanshi A.S. (2007). *Effect of Lantana camara L. cover on local depletion tree population in a tropical dry deciduous forest of India*. *Applied Ecology and Environmental Research*, 5(1), pp109-121.
- Hedges R, Suryaprakash, B, Achuth, L, Bawa, K.S. (1996). *Extraction of Non timber forest products in the forest of Biligiriranganath Hills, India*. *Economic Botany*, 50 (3), pp 243-251.
- Honnavalli N. Kumara and Rathnakumar S. (2010). *Occurrence and distribution of mammals, Distribution and Abundance of large mammals in Biligiri Rangaswamy Temple Wildlife Sanctuary, Technical report*. Published by Sálim Ali Centre for Ornithology and Natural History and Karnataka Forest Department Government of Karnataka, pp 1-78.
- John R Thorp. (2001). *Weed of national significance Lantana (Lantana Camara) Queensland Natural Resources and Mines Land Protection*. Locked Bag Coorparoo, pp 4151.
- Kamaljit S. Bawa, Gladwin Joseph, Siddappa Setty. (2007). *Poverty, biodiversity and institutions in forest-agriculture ecotones in the Western Ghats and Eastern Himalaya ranges of India*. *Agriculture, Ecosystems and Environment*, 121, pp 287–295.
- Liam Heneghan. (2012). *Out of kilter, on the balance of nature*. <http://www.aeonmagazine.com/nature->, pp 1-6.
- Lucy Rist, R. Uma Shaanker, E. J. Milner-Gulland, Jaboury Ghazoul. (2008). *Managing mistletoes: The value of local practices for a non-timber forest resource*. *Forest Ecology and Management*, ELSEVIER, 255. pp 1684-1691.
- Lucy Rist, R. Uma Shaanker, E. J. Milner-Gulland, Jaboury Ghazoul. (2010). *The Use of Traditional Ecological Knowledge in Forest Management: an Example from India*. *Ecology and Society*, 15(1),pp 1-20.
- Madegowda. C. (2002). *Tribal Participation in Collection of Non-Timber Forest Products in Biligiri Rangaswamy Temple Wildlife Sanctuary: A Study conducted in Chamarajanagar District of Karnataka State*. M.Sc (SD) Thesis submitted to Sikkim Manipal University of Health, Medical and Technological Science, Gangtok, pp-1-110.
- Madegowda. C. (2009). *Traditional Knowledge and Conservation*, *Economic & Political Weekly*, (21),pp 65-69.
- Mihir Shah. (2012). *Report of the Committee for Revision of MGNREGA Operational Guidelines*. Ministry of Rural development 2011 and 2012, State wise Wage rates for unskilled manual workers, Notification, New Delhi.
- Murali K.S and Siddappa Setty R.(2001). *Effect of weeds Lantana camara and Chromelina odorata growth on the species diversity, regeneration and stem density of tree and shrub layer in BRT sanctuary*. *Current Science*, 80(5), pp 676-677.
- Parveen Kumar Dobhal, Ravinder Kumar Kohli and Daizy Rani Batish. (2011). *Impact of Lantana camara L. invasion on riparian vegetation of Nayar region in Garhwal Himalayas (Uttarakhand, India)*. *Journal of Ecology and the*

Natural Environment, 3(1), pp. 11-22.

Pinaki Chakraborty. (2007). *Implementation of Employment Guarantee: A Preliminary Appraisal*. Economic and Political Weekly.

Ritesh Kumar N. Chandrashekar and K. K. Pandey. (2009). *Fuel properties and combustion characteristics of Lantana camara and Eupatorium spp.* Current Science, 97(6), pp 930-934.

Sharma G.P. and Raghubanshi A.S. (2011). *Lantana Camara L. Invasion and impact on Herb layer diversity and soil properties in a dry deciduous forest of India*. Applied Ecology and Environmental Research, Alok kft, Budapest, Hungary, 9(3), pp. 253-264.

Sushmita Mandal, Nitin D. Rai and Madegowda. C. (2010). *Culture, Conservation and co-management: Strengthening Soliga Stake in Biodiversity Conservation in Biligiri Rangaswamy Temple Wildlife Sanctuary, India*. *Sacred Natural Sites: Conserving Nature and Culture*. Edited by Bas Verschuuren, Robert Wild, Jeffrey A. McNeely and Gonzalo Oviedo, Earthscan and IUCN ,London, pp 263-271.

The Gazette of India. (2012). *State wise Wage rate for unskilled manual Workers (Rs. per Day) Notification of Ministry of Rural development*. New Delhi, the 23rd March.pp 1-2, Website, [http / / : www.NEREGA .net](http://www.NEREGA.net).