BIOINVASION

ENVIS Newsletter on BIOLOGICAL INVASION

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AMRITA VISHWA VIDYAPEETHAM
DEEMED TO BE UNIVERSITY
School of Engineering

Environmental Information System
India

ABOUT ENVIS

With great pleasure we would like to share with you that Ministry of Environment Forest and climate change (MOEFCC) has sanctioned an ENVIS (Environmental Information System) Centre to disseminate scientific, technical, and semi-technical information on various issues related to biological invasion (Invasive Alien Species) and conduct related research and extension activities.

Preventing and mitigating biological invasions is crucial to protect biodiversity, as well as food security, human health and the global economy. By recognizing the fact MOEFCC has recognized Centre for Sustainable Future at Amrita Vishwa Vidyapeetham as ENVIS Resource Partner on the theme Invasive Alien Species.

ENVIS network has been designed as the National Focal Point (NFP) for INFOTERRA, a global environmental information network of the United Nations Environment Programme (UNEP).

Some of the objectives of the Envis Centre (Invasive Alien Species) are:

1. To promote, implement, and coordinate Green Skill Development Programme (GSDP), an initiative to skill youth in environment, forest, and wildlife sectors and enable them to be self-employed. E.g., lantana craft and furniture making, herbal kitchen gardening of native species.

2. To implement and coordinate National Environment Survey (NES) a Grid-based Resource Information and Decision Support System (GRIDSS) for sustainable management of natural resources to fill in data gaps with respect to various environmental parameters such as emission inventory and pollution; forest and wildlife (flora and fauna); wetlands; rivers and other water bodies; public health, etc.

3. To implement and coordinate a Community-driven Environmentally Sustainable Village Programme (CESVP) with the objective of mobilizing communities on environmental issues, creating decentralized models of development to empower local communities and build an awareness driven atmosphere in villages to adopt environmentally sustainable practices at community level.

4. To build a repository and dissemination centre in Environmental Science, Information and Management (ESIM).

5. To support and promote research, development and innovation in ESIM.

6. To promote national cooperation and liaise with agencies concerned for exchange of environment and biological invasion related information.

Dr. Maya Mahajan

From the Vice Chancellor's Desk

Aum Amriteshwaryai Namah!

Amrita Vishwa Vidyapeetham is a beautiful expression of our Chancellor and world renowned humanitarian leader AMMA's infinite Compassion for enlightening the Humanity. Drawing its inspiration, guidance, nourishment, energy, and resource directly from AMMA, Amrita Vishwa Vidyapeetham has grown into a dynamic, 6-campus, multi-disciplinary University with over 15 schools, 250 academic programs (undergraduate, postgraduate, and doctoral), 1700 faculty, and 20000 students (www.amrita.edu), all united in their mission towards solving the monumental scientific and societal challenges being faced by the world today. AMRITA is both young and immensely dynamic, with a unique holistic approach to produce the societal contributors, entrepreneurs, managers, engineers, healthcare professionals, and scientists in all of its disciplines.

In a short span of 17 years, Amrita Vishwa Vidyapeetham has been nationally ranked 8th best university among all public and private universities in India and also ranked as the best private university in India by international ranking agencies such as the Times Higher Education.

AMMA says our sincere efforts bring Divine Grace and it is Grace that eventually transforms our efforts to fruitful outcomes. On the occasion of release of the first edition of Environmental Information System (ENVIS) news letter of our Environmental Information System Centre (ENVIS), School of Engineering, Coimbatore Campus. I congratulate you all for having brought it out so nicely. May I offer my prayers at AMMA's lotus Feet to shower bountiful blessings on all of the students, staff, and faculty of the Environmental Information System Centre (ENVIS), School of Engineering, Coimbatore Campus.

With very best wishes,
Dr. P. Venkat Rangan
Vice Chancellor

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Bio Invasion

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Lantana Camara
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Impact of Alien Species on Native biodiversity

Dr. Muthumperumal

Alien Invasive species have been identified as the second greatest threat to biodiversity after habitat loss. A species is labelled 'invasive' when it can grow and reproduce rapidly, and spread aggressively, with the potential to cause harm. Alien invasive species are either accidentally or deliberately introduced into an ecosystem that is remote to them. The species could be any living organism from bacteria and fungi to plants, insects, marine life, amphibians, mammals and so on. The exotic species are introduced to a new location without any environmental checks and balances such as seasonal weather, diseases, or insect pests that kept them under control in their native range. This mechanism is used to support food security, recreation opportunities, and ecosystem rehabilitation.

The newly introduced plant species invade the natural areas and often threaten the local native communities and reduce the native species diversity by forming dense monocultures or altering ecosystem functioning (Daehler, 1998; Khuroo et al., 2007).

In the case of native wildlife, the species may lack evolutionary defenses against the invading species, or be unable to compete with a species that has no existing predators. Invasive alien species can alter the habitat structure and disturbance regimes thus lowering the water tables, and increasing soil salinity levels.

Aquatic invasive plants affects the navigation and flood control, disrupt the recreational water usage, and drastically reduce dissolved oxygen levels leading to the extinction of aquatic animals and eventually become a breeding ground for mosquitoes. A case in point was the introduction of Cane toads in Australia to control the native cane beetles, which was harming sugar cane crops. The toads failed in controlling the cane beetles, but moreover reproduced rapidly and spread across Australia. The Cane toads produce toxic secretions that harm the native predators making it difficult to eradicate the toads.

Key Impacts of Alien Invasive Species on Biodiversity :

1. Habitat Modification

Lantana has invaded most of India's pasture lands (13.2 million hectares) besides forest and fallow areas, and the cost of controlling the situation is estimated to be US$ 70 per ha (Negi et al. 2019). At present, most of the natural forests in India are invaded by lantana resulting in the decline of the diversity and abundance of native species.

2. Predation

Guam, an island in the Pacific Ocean, is facing bird endangerment largely due to the brown tree snakes, an invasive species. The brown tree snake was introduced to the island and subsequently wiped out three-quarters of the native bird species and two of the eleven native lizard species. These snakes were also introduced to other Pacific islands and had similar impacts due to their preying on eggs, young and adult birds, and reptiles.

3. Competition for Resources

Invasive species can compete with natives for food and space. Zebra mussels (Dreissena polymorpha) have spread throughout the Great Lakes region drastically since the 1980s. Mussels require the hard substrate to live on, and the foreign zebra mussels occupy space that is vital for the native mussels causing the latter to perish in the process.

4. Hybridization

North American mallards (Anas platyrhynchos) have been introduced in many places around the world where they mate with other ducks Endemic ducks in Florida, Hawaii, New Zealand, and Africa is in danger of extinction because of the hybridization by the North American mallard.

5. Pathogens

Invasive species are plausible pathogens. A popular example is the chestnut blight, a fungus that wiped out all the chestnut trees in the eastern US during1940s. Chestnut trees, which were dominant throughout the eastern US, were replaced by oak trees. The effect of this change in dominant species was not fully studied at the time, but scientists posit that several species of moths went extinct when the chestnut tree hosts perished.

Invasive alien species adversely impacts the native biodiversity in several ways and various efforts have been made to control or eradicate them. These efforts include manual removal, pesticides, and biological controls. The eradication program that should be implemented depends on the strategy of particular invasive taxa.

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Invasive Weed to Wealth: Siruvani Story

Dr. Maya Mahajan

Siruvani hills, a part of the Western Ghats encompasses pristine, semi-evergreen, moist, and dry deciduous forests that represents rich diversity of flora and fauna. It is located 25km to the west of Coimbatore, away from the hustle-bustle of the city. The famous Kovai Kutralam waterfall is situated inside these forests. In the foothills of Siruvani, six hamlets of the Irula tribe is located, with a population of around 550. Tribal community in these areas are dependent on non-wood forest products, and is unable to cultivate their agricultural lands of approximately 45 hectares due to water scarcity and frequent raids by wild elephants and other animals.

The socio-economic conditions of the communities residing in these villages are poor. These communities relatively lag in areas like maternal and child mortality, size of agricultural holdings or the access to other facilities when compared to the general population in the urban areas of Coimbatore.

It is observed that the forests around these hamlets are severely infested by Lantana origin. This exoticspecies is invading different forest areas and posing a serious threat to the native vegetation of Western Ghats including the Siruvani area under the Coimbatore Forest Division (CFD). There is an imperative urge to control this invasion which is affecting the biodiversity of several forest areas. The Forest department is considering different options with community participation for managing this notorious invasive weed. Consequently, we commenced an initiative involving the tribal community of Siruvani area, to control the Lantana infestation by manual removal and uprooting from the nearby forest areas. The removed Lantana wood is then utilized to develop sustainable livelihood options for the community. For instance, the tribal community is being trained in making value added products such as low cost furniture, handicrafts, toys, and other utility articles using Lantana wood.

So far sustainable livelihood options have been generated for 100 families in four remotely located tribal hamlets in the Siruvani forest in this manner.

More than 100 tribal women and men are empowered by developing their capacity in Lantana wood furniture making. Also 30 tribal farmers are trained and are converted into Organic farmers and are following 100 % organic farming methods, practicing in 45 acres in Siruvani.

Assistance is provided to communities in the marketing of the products in potential areas in Coimbatore and other major cities in the country. Market linkages are now being established in these areas for sustainable marketing of these products with the support of national organizations like Tribal Cooperative Marketing Development Federation of India Limited (TRIFED), Tamil Nadu handicraft development corporation center. Online selling via e-commerce websites like Amazon is also being done. This program was supported by Sustainable Environment and Ecological Development Society (SEED), and the Department of Science and Technology, Government of India. As a promotion, exhibitions were organized in several locations at Coimbatore and Ooty.

Following the completion of the third phase of this project, it is expected that this tribal development Centre would become self-sustainable. The empowered tribals can continue production and marketing of various commodities using this transferred technology and in the process establish small scale enterprises. The Forest Department and Amrita University will continue supporting these tribals even after the completion of the project period.

After implementing this project successfully, we decided to develop a more structured certifiable course on Lantana craft and furniture making. We developed a module on the same and are conducting this course under the Green Skill Development Program funded by ENVIS-MOEFCC in various locations.

GSDP on Lantana furniture & crafts in Wayanad, Kerala

Dr. Magesh G.

Lantana camara of Central and South American origin, has today invaded several parts of the world. International Union for Conservation of Nature (IUCN) considers Lantana camara as one of the world's 100 most invasive species, and one among the 10 worst weeds in the world. This weed was introduced into India for horticultural purposes. Since then, this highly invasive weed has taken over the landscapes of India, growing in thickets and encroaching wastelands, forests, wetlands, and agricultural fields. *Lantana camara* is a threat to the biodiversity of any region due to its rapid growth rate covering the open grounds hastily hindering the regeneration process of the native species. Lantana often outcompetes other important species, leading to a reduction in biodiversity. The thorny nature of this weed prevents animals from feeding on its leaves. Furthermore, Lantana becomes a catalyst during forest fires as the fire spreads more through its rampant shrubs. Considering the encroachment of a large portion of the Indian forests by Lantana, the Indian Government has established several initiatives to curb this infestation.

The forest department deploys significant resources into the cutting and uprooting process of this plant to regulate its rapid growth. Several measures are being taken in order to address the Lantana problem. Mechanical control by uprooting plants and using it to make Furniture is proven to be one of the most successful initiatives. Green Skill Development Programme (GSDP) is a similar initiative towards addressing this problem.

Objective of GSDP

The objective of the Green Skill Development Programme is to provide training to tribal communities for creating low cost value added Lantana furniture and crafts using the invasive problematic Lantana plant. This program simultaneously creates a sustainable livelihood options for the tribal community, and lead to forest and biodiversity conservation.

Utilizing the vast network and expertise of Environmental Information System (ENVIS) Hubs / RPs, an initiative called Green Skill Development Programme (GSDP) was established for skill development in the environment and forest sector, to enable India's youth to make gainful employment and/or self-employment.

The program endeavors to develop green skilled workers who possess technical knowledge and commitment to sustainable development, which will help in the attainment of Sustainable Development Goals (SDGs).

In Wayanad, the Green Skill Development Programme was started on 24th of February, 2020, inaugurated by Mr. Sunil Kumar (Forest Range Officer, Muthanga) in the presence of
Mr. Sundar (Deputy Forest Range Officer, Muthanga), Mr. Subash (Trustee, Shola Trust), and Dr. Magesh G (GIS/IT officer, ENVIS, Amrita University). A subsequent presentation and video on the success stories of tribal communities of Siruvani on Lantana furniture and craft making.

Twenty tribal people attended the training program (GSDP) for making furniture and craft from Lantana Camara, known locally as 'Kongini' or 'Arippoochedi'. The majority of the attendees are women and youth from the neighboring villages where different tribal groups such as Kattu Naikkar, Paniya and Kavara reside.

Detailed training sessions on craft making from the basic collection of Lantana sticks from the forest, preparation of sticks such as boiling, peeling, and so on are provided. Following the preparation of sticks, the villagers are given the training to make elegant craft items and furniture such as Vegetable stands, flower baskets (different size and shape) hanging stands, chairs, stool, and so on. The completion of the training program is followed by exam and evaluation and each participant would be awarded a certificate from the Ministry.
The livelihood and income generated through lantana are sustainable as there is abundant population of this invasive weed in the Wayanad area. GSDP training can supplement their family income and improve their overall livelihood. As a part of the training, they are taught not to merely cut the plant, but rather uproot the plant including their deep tap root system, to ensure the prevention of their regrowth. Furniture and craft making from Lantana were evidently one of the most successful initiatives. Apart from its aesthetic appeal, the tag of being an eco-friendly alternative to wooden furniture has made lantana wood products a sought after variant in offices and resorts. Thus, through the conversion of Lantana into an economic value added product, the GSDP was able to not only convert the weed into wealth, but also bring about a balance in the local ecosystem. This aided in improving the livelihoods of people at the grass root level.

GSDP on Lantana Furniture & Crafts in Maharashtra

Mr. Binish M.B.

Introducing an exotic species into a relatively foreign environment often causes problematic conditions in the said environment and the species is then defined as an Invasive Alien Species. The alien species can be an animal or a plant from a distant area anywhere in the world and does not belong to the new environment. The major pathways of introduction are by ship ballast water, accidental release, and most often by people. Invasive species can lead to the extinction of the native plants and animals, destroy the biodiversity, and permanently alter that habitat (NOAA, 2017). These species are one of the greatest threats to global biodiversity, agriculture, livelihoods, human and animal health, and forestry (Pimentel, 2011). They are capable of disturbing not merely the environment or ecology, but also the local economy (Simberloff, 2003).

Hence, identifying the probable future distribution of this species is paramount and can be accomplished through early detection, prioritization of regions for conservation and effective management of invasive species (Bellard, 2013).

Lantana is a genus under the family *Verbenaceae*. These are shrubs that can grow within a range of 0.5–2 m height. Lantana is mostly native to subtropical and tropical American regions, but a few

taxa are indigenous to tropical Asia and Africa. In India, seven or eight such species like L. camara, L. indica, L. veronicifoila and L. trifolia are reported (Rajendran& Daniel, 2002). Lantana was initially brought to India in 1807 as an ornamental plant at the National Botanical Garden (Kohli et al., 2006), and also as for ornamental hedging, to Calcutta in the early nineteenth century (Hakimuddin, 1929). Subsequently, this plant proliferated across all open areas like roadsides, railway tracks, edges of crop fields, and open forests across the country. Today, it has become completely naturalized and found throughout India.

IUCN (International Union for Conservation of Nature) observes Lantana camara as one of the world's 100 most invasive species, and one among the 10 worst weeds in the world. Exotic plant species invasion poses a serious threat to native plant communities and ecosystems, such as population dynamics and community structure (Pimentel et al., 2001), and alters the native vegetation threatening the biodiversity (Mack et al., 2000). Habitat disturbance due to anthropogenic or environmental reasons (Heywood, 1989) modifies the microclimate, resulting in colonization of the invading species such as Lantana, particularly in the dry deciduous environment (Heirro & Callaway, 2003).

Objective

The objective of the Green Skill Development Programme is to provide training to tribal communities for creating low cost value added Lantana furniture and crafts using the

invasive problematic Lantana plant. This program simultaneously creates a sustainable livelihood options for the tribal community, and lead to forest and biodiversity conservation.

About Participants

Twenty tribal people have been attending the (GSDP) training for furniture making from Lantana weed (natively called 'Ghaneri'). Among the attendees, three are men and the rest are women, whose details are attached with annex 1.

Training Program

The program was inaugurated on 11th of February, 2020 by Mr.Shivaji Mahale (Panchayat Member, Duldhanwadi Village) in the presence of Mr Babasaheb Nivrutinath Pawar (Principal, NLC), Mr.Aniket Mahulikar (General Manager, Girivanvasi Educational Trust), Mr Valvi (Community Outreach Coordinator, NLC), Mr.Shailesh (Assistant Agricultural Instructor, NLC), and Mr Binish M B (Information officer, Amrita University). Mr.Aniket explained the invasive lantana plant and its impacts followed by a video showing the success story of Lantana furniture and craft making by tribal communities in Siruvani hills, Coimbatore. Following the event, the trainees along with their trainer visited the field, where lantana is present.

The trainees collect the lantana sticks every morning from the nearby village areas for making the products. In the first few days, they were trained on how to collect the sticks and their preparation for craft making on step by step basis. Later, the trainer taught them to create certain small handicrafts like hair combs, baskets (different sizes and shapes), pen stands and so on.

In addition, training was given on how to make the products trendy and stylish by applying varnish.

Dr. Maya Mahajan, Coordinator, ENVIS RP, Amrita University who is monitoring the training program visited the centre and gave a brief introduction about the program. She further explained the impacts of the invasive alien weed, lantana, and how this could be turned into a livelihood option. She recommended to the trainer certain fresh designs and ideas for craft making. Dr. Maya also interacted with the GSDP participants and staffs of Nareshwadi Learning Centre and collected the feedback on the training program.

Conclusion

The training program was completed successfully with the active participation of all the participants. The Nareshwadi Learning Centre team supervised the program while the ENVIS Amrita team regularly monitored the process. The final five days of the GSDP was scheduled for the marketing of the products and each participant was awarded a certificate from the concerned Ministry on completion of the training program.

Invasion of Giant African Snail & its Management Strategies in Kerala

Mr. Binish M.B.

Invasive Alien Species

Species that gets introduced to a new environment other than its natural environment and if this species becomes problematic, it is termed an invasive alien species. It can be an animal or plant from another area of the world that does not belong in their new environment. The major pathways of introduction are by ship ballast water, accidental release, and most often, by people. Invasive species can lead to the extinction of native plants and animals, destroy biodiversity, and permanently alter habitats (NOAA, 2017). Invasive alien species are one of the greatest threats to global biodiversity, agriculture, livelihoods, human, animal health, and forestry (Pimentel, 2011). They can disturb not only the environment or ecology, but also the local economy (Simberloff, 2003). Hence, identifying the probable future distribution of invasive alien species is of paramount importance of early detection, prioritization of regions for conservation and effective management of invasive species (Bellard, 2013).

The giant African snail (*Achatina fulica*)

The largest mollusk of the terrestrial ecosystem, the giant African snail (*Achatina fulica*) is a Gastropod species. The adult snails grow up to 20cm in length and 250g in weight. It is a rapid-growing polyphagous plant pest that has been introduced from its native range in East Africa to many parts of the world as a commercial food source (for humans, fish and livestock) and as a novelty pet (Kotangale, 2011). It is capable of easily attaching itself to any mode of transport or machinery at any developmental stage, and is able to go into a state of aestivation in cooler conditions. Hence it is readily transportable over distances. Once this species escapes from its captivity, it is able to establish and reproduce prodigiously in tropical and temperate locations. As a result, A. fulica has been classified as one of the world's top 100 invasive alien species by The World Conservation Union, IUCN (ISSG, 2003)

and is also recognized as the second worst invasive alien species in the world by the global invasive species database (Lowe et al., 2000).

The giant African snail (up to 17 cm shell length) is a pest that has an extensive negative impact on agriculture and can serve as vector for several parasites, including Angiostrongylus cantonensis, a nematode parasite that causes (human) eosinophilic meningitis, an emergent disease (Prociv, 2000). Apart from economic loss and human health issues, A. fulica, is also a general nuisance to people.

Giant African Snail in Kerala

The giant African snail was introduced into India in 1847 at Calcutta, from Mauritius by W.H. Benson, a malacologist (Srivastava,1992). Later on several incidents of introduction occurred in different areas by the way of trade and transport, intentionally and unintentionally, as pets, for commercial use, research purpose, and as a part of fantasy (Robinson, 1999). This snail was introduced to Kerala, in 1955 for research purposes.

An infestation of snails in the state was initially reported from Palakkad in the 1970s. From 2014 onwards, heavy infestation of Giant African snail was reported from various parts of Kerala during the Monsoon season. The recent studies stated that it has invaded all districts in the state, except Idukki (KSDMA, 2016). The presence of fewer predators, hermaphroditic nature, high reproductive rate, skill for hibernation, and generalist feeding nature makes them an invasive species (Thiengo et al, 2008) in Kerala. Giant African snail is known to attack more than 500 plant species, including vegetables, coconut, cocoa, papaya, banana, areca nut, coffee, and even rubber plants. The two key negative impacts caused by A.fulica in Kerala are the agricultural damage and the subsequent cost of controlling the snails.

Management of Achatina fulica

The management options are usually seen as mechanical, chemical, and biological control, in addition to ecosystem management. Physical control is dependent on the collection and demolition of snail and their eggs from the infested sites (Raut and Barker, 2002).

Chemical management of the snails includes the application of different chemicals to terminate the organism. Application of sodium chloride, arsenate-metaldehyde bait, Snail Kill (metaldehyde), and cypermethrin, copper sulphate was effective against A. fulica (Rao and Singh, 2002). The usage of plant-derived molluscicides like Cedrus deodara oil, Allium sativum bulb powder, and Nerium Indicum bark in snail control prove to be very effective (Rao and Singh, 2002). In addition, Tobacco Decoction – Copper Sulphate mixture (TDCS) is an effective removal method against A. fulica.

Biological control of A.fulica using its natural predators will affect the endemic snail population, and thus this method was not suitable in Kerala. Besides its natural predators Sus scrofa, Rattus rattus, Bandicota indica, Herpestes edwardsii, and Suncus murinus are the main local predators that help us to eradicate giant African snail.

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Endeavours by Our Nature Club

Dr. Maya Mahajan

Amrita Nature Club organized a rangoli contest for Amrita students, on the topic, Biodiversity of Western Ghats, on 20th December, 2019. Ten students participated in the contest and came up with innovative ideas creating rangoli on endangered species like Tiger and endemic species such as Malabar Parakeet. Few of them made rangoli of lives on land and forest conservation. The aim of the contest to cultivate Education through fun and art was accomplished.

Furthermore, a painting contest on the same topic was also held the next day. Students actively participated and drew paintings on different themes of nature and biodiversity. The paintings were fresh and remarkable that the judging process turned out to be challenging and hard.

In addition to this, a photography contest was also conducted on 23rd December 2019, where we received roughly 50 stunning photographs on the flora, fauna, and beautiful landscapes in the Western Ghats. The first prize was bagged by Mr. Hari Krishnan who has beautifully captured the photo of a herd of Asian Elephants, an endangered animal, in a jungle near the river bank. The second prize was bagged by Mr. Harish Kumar.

1st Prize Photography: Harikrishnan

2nd Prize Photography: Harish Kumar

1st Prize Rangoli: A Priyadarshini

2nd Prize Rangoli: T Ashwin

1st Prize Painting: A Priyadarshini

2nd Prize Painting: A Priyadarshini

Photo Exhibition and Film Show on Western Ghats Biodiversity

Dr. Magesh. G

A photo exhibition on the luscious biodiversity of the Western Ghats was conducted by the Environmental Information System (ENVIS) Centre in collaboration with Amrita Nature Club on the 14th, 15th and 16th of February, 2020. The exhibition was held at the New Auditorium as a part of Amrita university's ANOKHA tech fest 2020. Students from sixth to eighth grade and teachers of Amrita Vidyalayam and The Western Ghats International School, in Ettimadai visited the exhibition in addition to the students and faculties of the university. Awareness about the importance of biodiversity conservation and the gravity of the ongoing environmental crisis was the aim of this exhibition which was successfully achieved. The students were encouraged to develop a scientific passion and an attitude of conservation and mindedness that in turn inculcates the qualities of environment protection and sustainability in future generations.

Apart from the photo exhibition, a screening of the film 'Save our Shola', that documents the importance of Western Ghats' biodiversity, the threats to this ecosystem, and conservation strategies with peoples' actions, was held at ENVIS centre, and the Centre for Sustainable Future. Students and teachers of Amrita Vidyalayam and The Western Ghats International School participated in the same. Dr. Maya Mahajan, Associate Professor and ENVIS Coordinator at Amrita Vishwa Vidyapeetham delivered the introductory talk about biodiversity conservation and further interacted with students after the film screening.

The objective of the program was not only to inculcate a scientific attitude and research-mindedness in the students but also to create an environmental awareness. Such value added events create awareness on biodiversity conservation among the general population and in this context the school students, faculty and staffs of Amrita University, and nearby schools. Thus the initiative received a positive response and was applauded by all

An interview with the tribals of Siruvani regarding Lantana goods

Dr. Muthumperumal

A conversational interview regarding the Green Skill Development Program (GSDP) was done with the tribals of the Siruvani area, where they shared their experience and feedback on the training program for building furniture and other crafts like small toys from Lantana wood.

In the interview four woman trainees participated (Kaliyammal, Chinnathaai, Savithri and Lakshmi) and shared their experience. They started with the basic demographic details of the 58 families residing in the area. There are 30 males, 38 females and 50 children in the settlement. Further they shared their occupation details.

They were former daily wages labourers in the agricultural field earning 250 rupees per day. After the GSDP training that was first held in 2015 by Dr. Maya Mahajan of Amrita University, they have discovered a better source of income and livelihood. The first training program happened for 45 days with a total of 28 tribal people (24 females and 4 males) attending it. The GSDP training enabled them to build different furniture including sofa sets, bookshelves, chairs, vegetable racks, reading tables, waste bins, and swings.

This furniture was then showcased in various exhibitions where it received immense appreciation from the public and great sales. The consequent GSDP training was also conducted by Dr. Maya Mahajan, where 13 new trainees attended including 7 males and 4 females. The span of the training increased to 60 days with three trainers who trained the trainees to build new models of chairs, cots, and sofa sets. The furniture sold out within the first three months and the demand for the products rose among the public. Subsequently, the third training program for an advance level skill development was held for 10 tribal people, where mechanisms of small toys and furniture production were imparted to the attendees. The aim of this training program was to create sustainable livelihood support for the tribal communities through the manufacturing of furniture and small toys that are easily saleable.

Following the training programs, the tribal people have realized that furniture and small toy making using lantana sticks is the best livelihood support and profitable business when compared to their earlier daily wages job.

They explain the process that takes up to four months for making one set of sofa. The initial step is to collect the sticks from the forest, followed by the boiling of the sticks to increase the flexibility. The third stage is the peeling of the barks and sizing the sticks. These are then allowed to dry for two days before they are ready for building furniture. Finally, the designed furniture is bound at the corners using cane wires and completely varnished

Today people hesitate to go inside the forests for collection of lantana sticks

is the best livelihood support and profitable business when compared to their earlier daily wages job.

They explain the process that takes up to four months for making one set of sofa. The initial step is to collect the sticks from the forest, followed by the boiling of the sticks to increase the flexibility. The third stage is the peeling of the barks and sizing the sticks. These are then allowed to dry for two days before they are ready for building furniture. Finally, the designed furniture is bound at the corners using cane wires and completely varnished

Today people hesitate to go inside the forests for collection of lantana sticks due to the frequent presence of wild elephants in and around the settlements. In earlier times, the Lantana sticks were abundantly available near the tribal settlements, but later the Forest Department uprooted all lantana and planted teak and other native trees.

Thus, they need to walk long distances from their settlements and are often forced to face elephant conflicts, during the collecting stage of the lantana sticks. The number of participants is declining lately due to different reasons. Some join temporary jobs in the forest department, while many are engaged in livestock management. Few of the women candidates have opted to engage in tailoring job.

The tribal people are now finding the collection of lantana sticks as a tedious job and hope for some form of support from the forest department in the same. They are ready to happily continue the furniture production and make it their permanent profession and are eagerly waiting for a response from the forest department. Further they also find it necessary to have external support to market the produced furniture.

My Discovery Of Lantana Furniture

Mr. Jon William Bauer

In the United States, lantana is a favored ornamental plant. Its delicate inflorescences of red, yellow, orange, blue and pink grace the garden plantings of suburbanites throughout the country who flock to garden centers every spring and pay good money for cultivars with names like Miss Huff and Patriot Cowboy. In most of the country, winters are too cold for the plants to survive, so they remain annual adornments to our gardens.

In India, however, these non-native plants have become obnoxious and unwelcome guests, crowding out the scrub growth under forest trees and producing only toxic leaves that cannot be eaten by most animals.

I was therefore delighted to learn that a method had been developed by Dr. Maya Mahajan at Amrita University to manage these difficult plants. Unlike the gentle North American varieties, these fierce invaders grow study canes several feet in length which are harvested by hill station tribals who then use them to construct attractive rustic furniture. The furniture is quite cheap and very sturdy, the undergrowth of lantana is successfully managed, and the tribals have a new source of revenue. Everybody wins.

When I heard about this furniture, I made a trip to Amrita, where Dr. Mahajan and some of her assistants showed me the pieces on hand and took measurements for special-use items. At the end of what could be called a very long day (due to the weather interference on the cane harvesting), I had eighteen pieces at a total cost of less than 40,000 rupees. These include armchairs, armless chairs, coffee tables, a settee, a bed, bookshelves, and more. The commissioned pieces didn't always come out the way I had intended, but they are all useful and attractive. Everything has been admired by friends around the globe.

Lantana furniture has allowed me to help with a forest management project, to provide income to tribals, and to buy attractive cane furniture at a very low price. It has been a happy discovery.

Women's Day Celebration

On the occasion of Women's day, Dr. Maya Mahajan ENVIS coordinator was invited as chief guest at Sri Shakti Institute of Engineering and Technology. DR. Maya delivered an expert speech on tribal women empowerment in three states i.e. Tamil Nadu, Kerala and Maharashtra through Green Skill Development Program on Lantana Furniture Making.

Our Inspiring Mentors

Nature Conservation and Environment Protection have always been a way of life at Amrita. We are grateful to all our mentors for their constant encouragement and invariable support during establishment of this ENVIS Centre on Invasive Alien Species.

Prochancellor Br. Abhayamrita Chaitanya encouraging Nature Club students during plantation program.

Dr. Sankaran, Registrar and Dr. Jyothi, Principal ASE visiting Lantana Craft Exhibition

C. Parameswaran
Chief Operating Officer

Dr. Sasangan Ramanathan
Dean School of Engineering

NATURAL DISASTERS

Tsunamis.. Volcanoes..
Floods.. Tornadoes!
All random events? Maybe not...
Maybe we are conveniently ignorant..
while Nature is yelling at us to STOP!
Than the rate of nature's regeneration..
Our consumption is way faster!
Maybe it vents all of its pent up frustration..
in the form of natural disasters!
We are simply a tiny part of Mother Nature..
it is high time we realise!
Mend our ways effectively and soon..
Or else end up paying a heavy price!

Abhiruchi Arun @catharsis_by_words

Our Chancellor

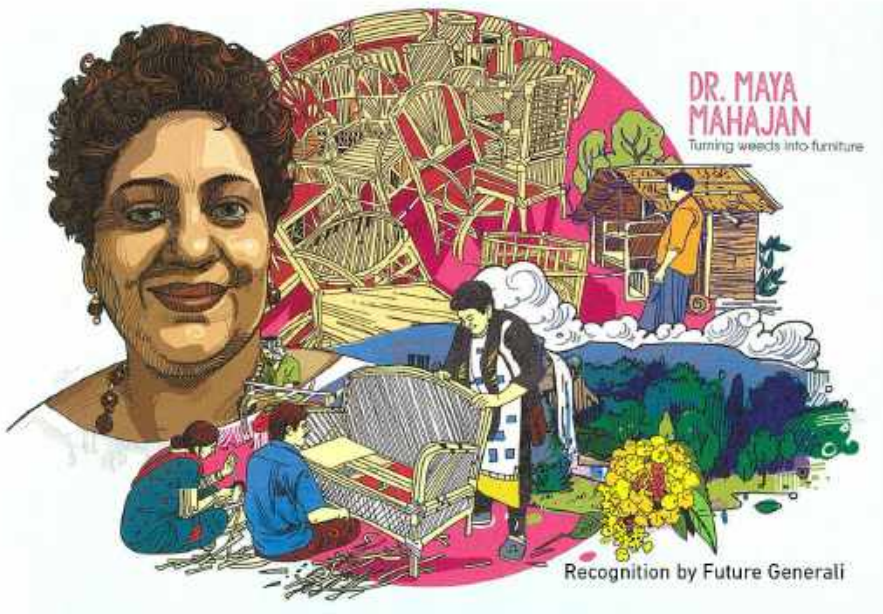
Amma Says...

By protecting and preserving wild and domestic animals, trees and plants we are protecting and preserving nature. Trees, animals, birds, plants, forests, mountains, lakes and rivers- everything that exists in nature are in desperate need of our kindness, compassionate care and protection.

There is an inseparable bond between man and nature.
For man there cannot be an existence removed from nature.

However, because of man's thoughtless actions, equilibrium in nature is getting disturbed and the pulse of human life is becoming erratic. Air and water are polluted rivers have dried up. Seasons arrive unreasonably. New diseases are spreading.
If things continue in this way, the human race is in for a monumental catastrophe…"

Conserving forests by empowering locals is our Contribution for a Win Win Situation for forests and tribals



Ministry of Environment, Forest & Climate Change

AMRITA VISHWA VIDYAPEETHAM
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