

## Sandur's bounty of medicinal plants disappearing in the haze of mining

By Pallavi Ail

G. Vishwamurthy hobbles along the rocky path announcing the names of plants, sometimes departing from the Kannada names to pronounce their botanical names. He doesn't know the names of all the plants. But his enthusiasm shines through as he tenderly picks up the saplings in the forest department nursery to describe their different healing and soothing properties.



*G. Vishwamurthy believes the Sandur MPCAs can be a boon if treated as such*

"I am a bare-foot botanist," announces Vishwamurthy, with a wide grin on his face. It is a frank confession. Vishwamurthy has not studied botany. He was an agriculturist for 20 years, after which his love for traditional ayurvedic practices drove him to conserve the biodiverse surroundings of Sandur taluk. He is a native of Bommaghatta, but he lives in Kudigli almost, 20 kms from Sandur.

We are in the medicinal plant conservation area in Sandur, the heartland of the mining scam embroiled district of Bellary. The size of the conservation area is 345 hectares, an almost 213 percent increase from the initial size of 110 hectares in 1995. The technicalities aside, the area is spread over two rolling hills and we are currently hiking to the peak of one of the hills which also houses the Forest department guest house. We pause there to take in the surroundings.

It is a picture in contrast. The two hills have a green cover. While the shade of green can be debated, no one can doubt they are covered with greenery because in front of it is another hill, which is bleeding red. Trucks, loaded with iron ore, presumably, race across the winding roads carved across its girth. Smoke and dust billows from underneath their busy wheels.

Vishwamurthy shades his face with his hand while gazing across and shakes his head absently.

"See, can you see that? It is destroying this beautiful place."

### Sandur – Princely in its resources

Sandur is one of the nine taluks of Bellary district. An erstwhile princely state, Sandur has been well known for its vast reserves of iron ore and manganese. The place has been mined since time immemorial, however, the judicious extraction of its ores turned to all a free-for-all

environmental rape when mining companies sprouted indiscriminately across Bellary district.

The Lokayukta report on illegal mining summarized it, "The entire range of the various aspects of illegal mining ranging from encroachments, mining without necessary permits and clearances, mining outside the permitted areas, mining beyond permitted quantities, illegal transportation of minerals etc."



*The hill opposite to the one that hosts the Sandur forest department's rest house*

While Sandur is synonymous with mining, the minerals are not all that it is endowed with. Sandur boasts of "southern dry mixed deciduous forest" and its iron rich soil is a boon for lush forest growth.

"In some parts, you won't recognise it's a deciduous forest," said Shashidhar, deputy range forest officer, Sandur forest department. "Its greenery is like evergreen forests."

His statement was substantiated while gazing at the hills while driving into Sandur. The Narihalla reservoir is dotted by heavily forested hills and green islands pop from between its sparkling waters.

"Sandur, madam, is like a bowl," said Vishwamurthy, cupping his hands to emphasize his statement. "And all around that bowl are hills. Those hills," he said, pointing them out. "Now what will happen when those hills are ...," he searches for the right words, as he mimics a digging action, "you get? Now all that dust is coming down to the bottom of the bowl, and all these precious plants are dying."

Sandur and the nearby Ramadurga village in the Kudligi taluk are rich in bio-diversity. They boast of diverse medicinal plants, many of which have not been properly documented.

## **The battleground — Sandur MPCA**

The Planning Commission had first mooted the idea of developing medicinal plant conservation areas in its "Report of the Task Force on Conservation & Sustainable use of Medicinal Plants," in March 2000.

It gave authority to state forest departments to set up MPCAs and observed in its report, "Considering that at present 90% collection of medicinal plants is from wild, generating about 40 million mandays employment current practices of harvesting are unsustainable and responsible for depletion of resource base."

Following that, Karnataka forest department with assistance of Foundation for Revitalisation of Local Health Traditions, setup 13 MPCAs

across Karnataka encompassing different forest types. Sandur in Bellary district is one of them.

Sandur MPCA falls in the SM block of reserved forest. The MPCA is surrounded on three sides by forests of RM block which acts as a buffer area. The MPCA is located approximately 10 kms from Narihalla reservoir and forms a part of the catchment area.

The MPCA contained 563 species of medicinal plants in 2001. That was the last time an official census took place, according to Naggi Reddy, range forest officer, Sandur forest department. However, that claim can be contested. There were 238 species plants recorded as growing in Sandur MPCA, in 2006, according to National Biodiversity Authority, an autonomous and statutory body of the Ministry of Environment and Forests. That means almost 58 percent of the plant species that used to grow there, don't anymore.

When I had visited Sandur in Oct. 2011, Shashidhar had just taken up his duties as a deputy range forest officer. The previous forest department staff had been replaced with a new roster consisting entirely of Lokayukta appointees. He had visited the MPCA a couple of times but he wasn't yet well-versed with its biodiversity. He had made a local, Chandrashekhar, tell him which plants grew in Sandur MPCA while he ticked it off a "List of medicinal plants in Karnataka."

The count was 95. That is a drastic spiral downwards of almost 60 percent from 2006 and a whopping 83 percent reduction from the "last official census" in 2001.

"Natural regeneration of most indigenous species is good and fairly well distributed throughout the area. Slopes have reasonably good grass cover and not much erosion is observed," said the MPCA plan document written in 1995 before delineating the Sandur MPCA.

"Sandur hill ranges form abundant source of iron ore and manganese and therefore number of mines present in the area. The MPCA has mercifully escaped from the mining areas," said the document based on the observations in 1995.



*A rusted board mapping the MPCA and key spots within greets one at the entrance*



*A fire line to prevent spread of accidental forest fires*

Today, the reality couldn't be more different. The trees in the MPCA, other than the plants in the old nursery, are barely flourishing. We went there again in Feb. 2012, which marks the start of the dry season. The trees had already withered up. The "nulla", an offshoot of the Narihalla reservoir, near the entrance of the MPCA was dry.

However, the forest department officials are positive about its rejuvenation.

In Oct. 2011, Shashidhar had been looking forward to overturning all the environmental mess left by his predecessors.

In Feb. 2012, all he wants is that no more illegal acts are committed. He says, the scale and scope of the environmental damage in Sandur is humbling.

"But we have already taken several steps towards developing the MPCA," said Shashidhar.

## **Local participation – More of a curse than a boon**

Vishwamurthy points out various spots in the MPCA, where the locals used to come and "turn the place into an immoral den," according to him. There used to be liquor bottles tossed carelessly amongst the plants and trash scattered everywhere. He also said that prostitution took place within the MPCA.

Now, as Vishwamurthy looks around, he accepts things are a bit better, though not to the extent he wants.

Shashidhar points out the fire lines dotting the hill side. It is like a continuous line of thick black lines slashing its way across the middle of the second hill.

"We burn plants deliberately, especially the dry grass, which will stop any spread of fire," said Shashidhar.

He is emphatic in stating that the MPCA has seen no fires in last 20 years. He reiterates this statement in front of his senior, Nagi Reddy, who silently shakes his head in denial.

Reddy is ambivalent about the issue of forest fires. "There are two kinds of forest fires, incidental and accidental. Now the question is which category does Sandur's forest fires fall into," said Reddy.

He points to Vishwamurthy saying, "I have no official comment about this issue. Why don't you ask someone who is associated with this area longer?"

Vishwamurthy smiles and answers, "The fires are often caused accidentally. People leave cigarette butts, the grass is dry, and winds are fanning the flames."

Nagi Reddy interjects, "None of the fire incidents are accidental. All are incidental."

He said that often sheep rearers set fire to "tougher plants" so that the sheep can access the plants beyond. He also said there are elements that set fire so as to distract forest officials. While the officials are tending to the fire, they sneak in and take precious plants which they later sell. He mentioned one such individual who has roaring business selling oil, extracted from a type of lemongrass that grows only within the MPCA.

"We now know about his activities, so we are keeping a close watch. He has not done anything till now so we suspect he may have stopped his activities," said Shashidhar, while refusing to name the individual, as they didn't have requisite proof.

The forest department officials do not allow grazing within the MPCA. They also try to restrict people from coming within, but that is a difficult task considering they do not have the manpower required to stand guard 24X7.

They conserve the existing indigenous medicinal plants growing in the MPCA.

"We would like to introduce new species of plants but development work has been prohibited by the circle head – chief conservator of forests," said Shashidhar. Locals initially were welcomed to participate in the conservation efforts. They also had free run of the MPCA to gather any herbs that they used to use traditionally. This wasn't frowned upon because the locals did not take plants indiscriminately.

Vishwamurthy agreed. "Locals want only money, of the mining people. They don't want anything to do with environment. They just use the area to drink and enjoy," he said.



*The Sandur forest department sells the saplings grown in the nursery within the MPCA*

But over the years, the locals have veered off towards mining.

"There is no participation from locals now," said Shashidhar.

The forest department has also setup "watch and ward" groups. Each group consists of four members. Their job is to take periodic rounds of the MPCA.

"We support existing species," said Reddy. "That is our primary responsibility." They also undertake soil moisture conservation work. They use a technique termed as "barav" around plants. By these

techniques, moisture is saved and there is “capillary breakage” of water within the soil because of which moisture is retained.

This is important, as the area receives 550ml – 650 ml rain per annum. This year, it was only 150 ml. this is a sharp decline from 855 ml of rain it received in 1995. They have also constructed check dams on Narihalla to control flow.

However, while on tour within the MPCA, one of these dams was broken and barely resembled a check dam anymore. However, that didn't seem to be much of a problem, considering there was barely a trickle of water in the nulla.



*The check dam on the nulla within the MPCA is broken*

There is a problem of effective management of the MPCA. Vishwamurthy is candid while pointing out forest department inefficiency.

“I have struggled four or five times to regulate this MPCA or improve it. There are some plants with another board and another board with some plant,” he said referring to the name boards setup in front of the plants within the MPCA.

## The plants that refuse to die

“Every woman, when she comes home, she comes with a *ramake*,” said Vishwamurthy, smiling a toothy grin. “You know what a *ramake* is?”

He mimics the action of grinding with a pestle in the mortar. “It’s a grinder. It is made from..,” he pauses, as he searches for the biological name of the plant, “*acacia catechu*.”

“When anything is grinded in *ramake*, then its secure for three days, in mixer, it lasts for three hours,” said Vishwamurthy.

Vishwamurthy does not know about all this. All he knows is that *aushadhi* works. He has not taken allopathic medicines in the last 20 years.

“Scientists, they view from different angle,” he said. “Locals have a lot of knowledge. They are not expressing to scientists. They tell you when you develop relations with them.”

He rattled off many names in fast succession. “*Doddapatre*, you go homes. They use *doddapatre* to make chutney. Your cough, fever goes away. Then there is *vondalaga*, it is taken to improve memory. It is like *shatavari*, except *shatavari* is also used for reducing sugar.”

When the forest department’s jeep winds its way to the entrance of the MPCA, we first stop to get a look at the layout of the area. The rust-speckled board shows a sprawling terrain over 345 hectares. The Sandur forest department has created “theme gardens” to develop interest in locals to cultivate medicinal plants.

The first garden is “*navgraha van*” or “garden of nine planets”, it based on the nine planets which are revered in Hindu religion. Other is “*rashi-van*” or “garden of astrological signs” which, is based on the 12 astrological signs.

The jeep then stops in front of long rows of saplings nested in plastic pouches. These medicinal plants are sold by the department.

A slight detour and we end up in a regimented path of land bisected by a narrow pathway. On both sides of the path are carefully grown plants with rusted nameplates in front of them.

Of the indigenous plants that grow in the MPCA, there are two endangered plants, one moderately threatened and three vulnerable, according to the IUCN Red List of Threatened Species. They are *commiphora wightii* and *pterocarpus santalinus*. The three vulnerable species are *pterocarpus marsupium*, *santalum album* and *saraca asoca*.

Shashidhar pointed our young sandalwood trees. “These are young now. After 8-9 years, the problems will start. When these trees become full-grown, we will need more manpower. Then, illegal cutting of sandalwood will start. Currently, there are no issues,” said Shashidhar.

Of the 95 species that continue to grow there, some plants have already made their mark in the pharmacological world.

Medicinal plants have spawned their very own version of medicine, ayurveda. India has, since times immemorial, distinguished the potency of ayurvedic medicine by recognising it as a medical degree with allopathy and homoeopathy.

Ayurveda has always been hailed as a cure without side effects that allopathy carries in its wake.

“Medicinal plants have been used by mankind for millennia; their use is as old as humanity itself. The range of species used and their scope for healing is vast. Cures as yet undiscovered may exist in plants as yet undescribed,” says Botanic Gardens Conservation International, a charity organisation based in UK.



**Vishwamurthy points out a tree, “mulla muthuja”, whose thorns are used to burst pimples, removing their occurrence. The tree is placed outside homes during weddings so that young ladies can take advantage of its healing properties.**

The report continues to say, “In fact, of the total pharmaceutical drug supply available worldwide, only 15% is consumed in developing countries (Lydecker et al., 1992), supporting the much-quoted WHO’s estimate that 80% of people worldwide rely on traditional medicine for their primary healthcare. The majority of these people are in developing

countries, where rapid population growth is expected to increase pressures on medicinal plant resources.”

The most significant statement would be, “In fact, as many as 50% of prescription drugs are based on a molecule that occurs naturally in a plant, with some 25% of prescription drugs derived directly from flowering plants or modelled on plant molecules (Foster and Johnson, 2006). In many cases modern chemistry cannot offer viable alternatives to active botanical compounds. The compound paclitaxel (found in *Taxus* spp. and source of the anti-cancer drug, taxol) was described as the kind of molecule that no chemist would ever sit down and think of making.”



*Vishwamurthy pulls a branch of "andraographis panicula," which is growing wild in the MPCA*

Bastyr University, an institution which conducts studies in science-based natural medicine, published a paper in Aug. 2000. The university had

conducted clinical trials of “andrographolide,” a compound sourced from the medicinal plant *andrographis paniculate*, on HIV positive patients. The trials concluded that the plant-sourced compound inhibits HIV and leads to a rise in “CD4(+) lymphocyte levels in HIV-1 infected individuals,” that is, it increases immunity. Also, during the duration of this clinical trial all anti-retroviral drugs were stopped for the test subjects. *Andrographis paniculate* is a resident of Sandur MPCA.

National Hospital for Neurology and Neurosurgery based in London conducted a clinical trial on Parkinson's disease patients, of the seed powder of the leguminous plant, *mucuna pruriens*, another Sandur MPCA regular. The basis of this clinical trial was, “has long been used in traditional Ayurvedic Indian medicine for diseases including parkinsonism.”

Parkinson's disease patients are treated with a pharmacological formulation called “L-dopa” which also occurs naturally in the plant *mucuna pruriens*. The patients were given the natural source and the normal medicine. The conclusion was, “this natural source of L-dopa might possess advantages over conventional L-dopa preparations in the long term management of PD.”

The cancer treatment drug Anvirzel is sourced from the plant *nerium oleander*. A compound derived from the plant, oleandrin or PBI-05204 has successfully passed US-Food and Drug Administration trials in 2011 and is now a prescribed drug for cancer patients under “Investigational New Drug application” of the FDA. *Nerium oleander* is another star of the Sandur MPCA.

*Gymnema sylvestre* has been traditionally used in ayurveda to control blood sugar levels. But modern chemistry woke up to its benefits when in 2005 scientists from King's College; London established its benefits in controlling diabetes. The study concluded, “OSA, a water-soluble extract



of *gymnema sylvestre*, caused reversible increases in intracellular calcium and insulin secretion in mouse and human  $\beta$ -cells.. These data suggest that extracts derived from GS may be useful as therapeutic agents for the stimulation of insulin secretion in individuals with Type 2 diabetes mellitus.”

The list continues till all the 95 plants are covered, which naturally cannot be covered fully here. This is not including the plants that have been lost since inception of the MPCA. Those plants may have had other precious medical breakthroughs hidden in their genetic structures.

### **Mahaushadhi – What’s all the fuss about?**

“Do you know the difference between an MPCA and MPDA?” asked Ranjit Puranik, CEO, Shree Dhootapaeshwar Limited, a company that is in the business of ayurvedic health care for over 135 years.

A member of the Finance Committee of National Medicinal Plants Board and also a member of the steering committee for AYUSH of Planning commission for the XII Plan, Puranik explained that a MPCA is basically for conservation of medicinal plants that grow *in situ*. No external interference is allowed, even if of a beneficial kind whereas, a medicinal plant development area is created for commercial purposes.

“So if it’s a conservation area – sustain it, if its development area – exploit it,” said Puranik. “There are around 2,000 acres of MPCA in India and around 500 acres of MPDA.”

So what’s the big deal about medicinal plants? The average middle class man does not walk around chewing leaves, does he?

Medicinal plants have given birth to an industry consisting of phyto-pharmaceuticals, herbal or dietary supplements, nutraceuticals, cosmeceuticals and just plain herbal raw material.

“At present, 90% collection of medicinal plants is from the wild, generating about 40 million mandays employment (part and full),” according to Report of the Task Force on Conservation & Sustainable use of Medicinal Plants, a Planning Commission report made in 2000.

The same report continues to say, “There are about 4,60,000 registered practitioners of Indian Systems of Medicine and Homoeopathy using medicinal plants in the codified streams. Further, there are 7843 registered pharmacies of ISM and 851 of homeopathy and a number of unlicensed small-scale units. Besides meeting national demands, they cater 12% of global herbal trade.”



*Indian market shelves are crammed with ayurvedic products, from medicines to cosmetics*

If we take up any plan that revolves around agriculture or sustainable agricultural practices that have been initiated by the government to

encourage the sector, we cannot deny that each and every one of those plans have an impact on medicinal plants sector, according to Puranik.



*The nulla that once originated from the Narihalla reservoir was so powerful that it had cut its way across the wall of rock creating a gorge. Now, there is barely any water. Inset: Shashidhar, deputy range forest officer, Sandur forest department*

If we delve and zoom onto the chain, then, “starting from the collector, to the district consolidator, to city-based primary trader, then the secondary and tertiary traders, and then the exporter,” this is the chain of people affected directly by growth, propagation and business of medicinal plants, according to Puranik.

In 2005-06, the annual turnover of the herbal industry in India has been industry estimated at more than Rs. 88 billion. World Health Organisation estimates the global demand for medicinal plants to be \$5 trillion in 2050.

However, despite numerous reports detailing India’s lack of regulation for this sector; there is still no transparency or central authority that overlooks it.

“There are so many medicines in our natural forests. I have ventured in Himalayas for years and years as a student. Every herb was available in Himalayas,” said Hans Raj Bharadwaj, governor of Karnataka, during the inaugural address of the 7<sup>th</sup> NUTRA India summit in Bangalore. “But degradation of climate and change in environment, those drugs have disappeared. We are doing cultivation of herbal plants also. But actually, neither the government has launched a powerful plan of research and development of these medicines, nor has the private sector done anything.”

“70 to 75 percent of the Indian populations live in about 5,76,000 villages located in different agroclimatic conditions,” according to the Planning Commission.

That is a massive percentage of Indian population that can be harnessed to develop medicinal plants. Majority of the ISM&H drugs originate from the unorganised sector, which brings into question the qualitative standards of the medicines they generate. The market is flooded with “ayurvedic” preparations that promise everything from superior brain power to longevity of life, except many of them are spurious and prey on consumer anxiety.

The need of the hour is to create a singular authority that will govern the medicinal plants industry from the grassroots to the final consumer. Growth and harvest of medicinal plants can generate much-needed employment in villages. Investment in research and development of compounds derived from medicinal plants needs to increase. A cure for a disease which originates from India will not only have a human impact across the globe but also result in higher revenues from exports.