

REWILD

JUNE 2016

ECOLOGICAL LIBERATION



Re-finding...

It was 4 a.m. and I had been drawn out of bed and planted in the bus, all within the last 15 minutes. My head rested on the rigid seat and I craned my neck to the right to be near the edge of the window. I consciously kept my head still, not willing to give in to the inertia of the jerky bus and abandoning sleep entirely.

As the bus accelerated on NH 24, the wind gushed into my face. I kept gazing out the window at the changing frames that passed almost instantly like the pages of a flip book. As expected of a reader, some chapters of the story struck me more than the others. The haphazard mounts of rubble on the road side that failed to suggest where they came from. A cluster of mundane and robotic structures, some dull white and others their mutant, coloured counterparts. The familiar urban creek with a pool of algae and sewage stagnant near the outlet of the pipe as though hesitating to penetrate deeper water. Two mortared brick floors of a building under construction like the jaws of a wide mouthed crocodile with bamboo sticks on the façade for teeth. Waves of black smoke gracefully rising heavenward from the mouths of what seemed like giant incense sticks. A tall glass monstrosity standing aloof in the distance like a King breaking the monotony of the Pawns lined at its feet. Cloaked by the dim morning light, a compact landfill standing tall and proud, feigning to be God's own. Hurling to keep up with the tight schedule, the bus moved like a rocket leaving the Earth behind. Only this time the mission wasn't a discovery but rather a re-finding.

I am 21. What could I possibly want to re-find? My perpetually misplaced earphones, my mother would tell you. But right now these were snugly resting in my ears and Xavier Rudd held me semi-conscious with his hypnotic rhapsody. He told me to "remember my place," "To follow the sun, the direction of the birds, the direction of love". Through the window the pages fluttered even faster in the wind as we crossed the city limits. We were headed in the right direction.

Most parents keep handy a list of apocalyptic repercussions for when they find their children derailed or wavering from their target, losing direction. This method has proven, with a few exceptions, to have consistently failed. What seems to invariably have worked for my parents is shifting the focus from the target itself. If they ever found me losing sight or motivation they'd encourage me to look beyond the challenge. "Do your best and entrust in us the rest," they'd say. If what lay ahead was worthwhile they knew I would tirelessly work towards it. They'd promise to take me once again where the day and time were unknown if not for the sun and the birds and the flowers; where the surroundings reverberated with the shrill sound of silence; where trees were the tallest and the strongest structures for miles on end. Reinvigorated by this thought I would strive harder to accomplish the task at hand.

It wasn't until recently that I had begun questioning my behaviour. Despite being "settled" in the city since the very beginning, life seemed to possess a degree of transience, a limited sense of purpose, something of passing significance in the larger scheme of existence. In short, the sun and the birds pointing me to "my place" had led me away from what I had thus far called home.

Fifteen days ago I met twenty-two others like me. Conflicted. They now sit on the seats near mine, looking out their windows. We are going to figure this out together.

Saumya Chaudhari

Editors

Rohini Deb
Saumya Chaudhari

Copy-Editors

Chaitanya Patil
Phungreikhan Longvah
Aishwarya Varadharajan
Richa Agarwal
Shruthi N Jagadeesh
Tishyo
Rishabh Shrivastava

Photographers

Ajay Pratap Singh
A Harshita
Phungreikhan Longvah
Tishyo

Design team

Shruthi N Jagadeesh
Mensha Puri Goswami
Ajay Pratap Singh
Rohini Deb
Saumya Chaudhari

Illustrators

Mensha Puri Goswami
Ajay Pratap Singh
Shruthi N Jagadeesh

Panel Credits

Illustrated by: Ajay Pratap Singh, Mensha Goswami, Saumya Chaudhari, G Jamunashree, Phungreikhan Longvah, Shruthi N J.
Compiled by: Shruthi N J
Cover design: Ajay Pratap Singh



We are on the web too

www.agendaforsurvival2k16blog.wordpress.com

www.facebook.com/agendaforsurvival2016

CONTENTS

4	The journey of shit: Delhi to Chinoni, via Corbett	6	Caste-ing away our waste
8	Why waste?	9	Pooping perfect
10	Who's the real victim?	12	The dying breed
20	Like land, like culture	22	From earth, arose a mud house
23	Gen-Z farming	24	Of herbs and habitats
26	Giant eye	27	शिक्षा की परिभाषा
28	Enviro-heroes	30	The green alphabet



Centre for Science and Environment
41, Tughlakabad Institutional Area,
New Delhi – 110062

COURSE CONTACTS

Ranjita Menon

Prog Director, Environment
Education Unit
Email: ranjita@cseindia.org
Office Tel: +91 (011) 29955124/125
Fax: +91 (011) 29955879

Sharmila Sinha

Deputy Programme Manager,
Environment Education Unit
Email: sharmila@cseindia.org
Office Tel: +91 (011) 29955124/125
Fax: +91 (011) 29955879



The drain outside the resort, Tusk and Wings, at Ramnagar in Uttarakhand. Photos: Tishyo

The Journey of Shit: Delhi to Chinoni, via Corbett

What happens after we flush? An investigation into the shit that we are blind to

■ TISHYO

Before we delve into the thick of things, let me tell you how I came about writing this article on SHIT. I, an engineering student, came to Agenda For Survival, 2016, a summer course, with a somewhat blurred understanding of the environment. The one thing I knew for sure was that it was getting degraded while most of us remained unaware.

So, as a confused omnivore, I began my journey of SHIT. In the first few days, some questions got me thinking: 'Where does the water come from?' 'Where does it go?' The first question had easy answers: groundwater, surface

water and rains. The second one posed a lot of ambiguity. This left me wondering, what happens to my daily flush. So here I am mapping SHIT – how people deal with faecal waste and how it is treated with thereafter.

Living in Delhi, I always assumed that we had proper sewer lines and treatment plants, or some other alternative waste disposal system. Bhitush Luthra, Senior Research Associate at Water Programme, Centre

for Science and Environment (CSE), informed us that Delhi has 35 Sewage Treatment Plants (STPs) and these do not treat all the sewage generated in the city.

I decided to track faecal matter of Indian Institute of Technology (IIT) Delhi campus, my home, a premier institution of this country; a hotel where we stayed in Dotyal, in Ramnagar, Nainital district for our visit to the Jim Corbett National Park; and thereafter to the premises of Institute of Himalayan

Of India's total of 816 Sewage Treatment Plants, only 522 are operational. Despite the NCR having 35 of these STPs, they are working under capacity



Environmental Research and Education (INHERE) Chinoni village in District Almora, where we ended our trip.

IIT Delhi's residential area has 24-hour water supply on most days. Water and sewage pipelines are built underground, waste collected from all the households, and then carried to the nearest government owned STP. None of the Municipal Corporation of Delhi (MCD) workers I spoke to could tell me where the waste went after treatment.

Shantanu Kumar Padhi, Research Associate at CSE's Water Programme, informed us that Delhi has around 2,000 unplanned urban settlements. Most of them are not connected to STPs; so how do they deal with their waste? Usually all such colonies have cesspools (tanks where the faecal matter is collected over a long period of time and then emptied out once they're full). There are special kinds of tankers that are used to empty the faecal matter. About 400 such tankers operate in Delhi alone.

Anil Yadav, another Research Associate at CSE's Water Programme, explained that these tankers (similar to water tankers), are driven around on either small trucks or tractors. Attached to them is a pipe that is inserted into the cesspool to suck up the waste from the pits. However, it is illegal to operate these tankers, and there are no designated areas to dump this waste.

Chhavi Sharda, Senior Research Associate, Water Programme, CSE told us that after the faecal sludge is carried from homes, it is dumped in storm water drains or the existing sewerage network. Untreated waste from these canals eventually reaches the Yamuna river. The existing sewer lines also can't handle the dumping as they are inequipped to handle such volumes of waste. Many a times they burst, leading to more pandemonium on the streets and at the same time, contamination of the groundwater. Some tankers are also emptied into farmlands at the periphery of Delhi.

From Delhi, we took a field trip to the Jim Corbett National Park, known both for its tigers and the huge number of resorts that are located at the outskirts

of the tiger reserve. The resort we stayed in dumped most of its waste into a small canal that ran around the perimeter of the place. We decided to follow this canal and saw that it lead straight into the forest. On inquiring, the staff confirmed that all resorts simply dump their waste into the river.

After our stay at Dotyal, Nainital district, we went to stay in Chinoni village, in Almora district of

have broken down the faecal matter. INHERE has also helped some villages in the district install these septic tanks — either connected to individual sanitary toilets or multiple toilets. As per a study conducted by INHERE, a 5 cubic feet pit can handle the waste of a family of five for over 20 years.

From my investigation, I learnt that proper waste management can only be ensured in a decentralized

A toilet at Dotyal. Photos: Tishyo



Uttarakhand. For the next two days, our home was this picturesque village, on INHERE's premises. Here, we learnt about the ideal usage of a septic tank on a mountainous terrain. The waste from the guesthouse was collected in an unlined septic tank that was 5 feet by 10 feet in dimension. These septic tanks should be placed exactly at a depth of 5 feet below the ground level. If placed

manner. The cost of laying sewerage network is a staggering Rs 3-4 crore per million litres per day (MLD) in Delhi. This includes the cost of acquiring the land, digging and setting it up, and pumping the sewage. In this day and age of Smart Cities and Swachh Bharat, where there is talk of sanitary toilets in every household, isn't management of faecal matter an issue that needs to

SHIT - Store High in Transit - warning for seafarers carrying their faecal matter to be dumped at the next port of call

any lower, they can't function in this terrain, as there wouldn't be enough microbes to ferment the human excreta. INHERE has worked with many villages in Uttarakhand where they have built septic tanks at least 30 feet away to maintain the cleanliness of their water sources. The unlined pits ensure that the soil gets replenished after microbes

be talked about and integrated into building plans?

One can't keep blaming the government for its lack of implementation. To deal with such problems, one needs to play a more proactive role and ensure that the faecal matter we generate is properly treated. It's time we ask, 'Where does *our* shit go?' ■



Caste-ing away our waste

For centuries, a community has been socially delegated to dealing with human waste. How long can they continue to take our shit?

■ SHRUTHI N JAGADEESH

Neoliberal ideologies say that our hard work and intellect determine our social and economic status, and that we deserve our social positions. In the Indian reality, however, thousands of people and structures act together to give us what we have. From sweeping public roads, to collecting and disposing household waste and clearing human excreta, many of our daily needs are silently taken care of by the unseen and unknown. These invisible hands most often belong to specific communities (lower caste, most often Dalit), and are dominated by women. It is therefore vital to see them as a part of the larger system.

Manual scavenging is one such activity, which broadly takes two forms. In the first kind, faecal waste is scooped from dry latrines and carried in overhead baskets. This custom, dominated by women, is still prevalent in smaller cities and rural areas. In the second practice, more common in urban areas, men enter sewer lines to unclog them; a practice probably even more hazardous.

Manual scavenging is deeply and inextricably colonized by caste. In the foreword of *Unseen* by Bhasha Singh, Bezwada Wilson, a leading Dalit activist with the Safai Karamchhari Andolan (a national movement for the eradication of manual scavenging, and their rehabilitation) wrote, "...this practice has shackled the whole community in deep insecurity so that many of us do not even realize that this disgusting work we are subjected to daily – this work of picking up human excrement –



A woman carrying faecal matter from a dry latrine.

Source: Safai Karamchhari Andolan

is, in fact, a symbol of feudal oppression. The mother-in-law feels very proud in giving a scavenging basket and broom as the first gift to her daughter-in-law, as part of her legacy...this oppression has continued from generation to generation, making victims of a whole community" (2014).

Ritu Sinha, a sociology professor at Ambedkar University Delhi, talks of how people going into the drains have less than basic facilities, and then because their work is dirty we distance ourselves from them. Unfortunately this has become normalized because it is a part of the caste system, and yet it is repeatedly justified as an occupation.

In 1993 'The Employment of Manual Scavengers and Construction of Dry Latrines (Prohibition) Act'

was passed with imprisonment for up to one year and/or a fine of Rs 2,000. In 2013, after 20 years of no convictions or action, a new law was passed: The 'Prohibition of Employment as Manual Scavengers and their Rehabilitation Act 2013.' In 2014, the Supreme Court passed a judgement based on a writ petition by the Safai Karamchhari Andolan, which clearly says that state governments must "(i) fully implement and take appropriate action for non-implementation as well as violation of the provisions contained in the 2013 Act, (ii) to prevent deaths in sewer holes and septic tanks and make the manual cleaning of sewers and septic tanks a crime even in emergency situations, and (iii) to give compensation of Rs.10 lakhs to families of all persons who have died in manholes and septic tanks since 1993." Two-and-a-half years

later, less than 3 per cent of affected families have received compensation, and manual cleaning of drains and septic tanks continues unabated.

As per the writ petition, based on extensive research done across the country, the number of dry latrines had increased since 1993, and there were more than five lakh people, about 95 per cent of them Dalits, still working as manual scavengers. Nevertheless, we must remember that the problem is much deeper than quantifiable statistics.

The problem is also environmental, and is in the poor management of this waste. When we flush our toilets and forget about our waste, it has to be cleared away, and banning people from doing that doesn't magically take away the problem. Anjor Bhaskar, an activist



and research analyst involved with waste pickers and waste disposal says, “It just so happens that the caste system conveniently allows some communities to clean it up rather than others, but if a pit latrine is filled or a sewage pipe is clogged, someone will clean it, whether Dalit or not.”

Furthermore, the alternatives to manual work so far have been much more capital intensive, requiring machines, equipment, and expensive gear. Since this is not considered economically viable, Anjor believes that solutions need to be found that will stop the need for cleaning of pipelines or latrines altogether. A decentralized system, with on-the-spot sanitation, short-term solutions, or localised disposal through septic tanks and other environmentally clean solutions, is required for the entire system to change, and for there to no longer be a need for the faeces to be transported. The problem boils down to our need to flush and forget, to our assumption that someone will always clean up after us. And yet, if we begin to change our mindsets, to begin to be more responsible, and more aware of the waste we generate (whether excreta or other waste), we can begin to change the system that forces someone else to carry our shit around.

Beyond the environmental management of excreta, there is also the question of labour. In a developing country like India, if cheap labour is willing to work in less than ideal conditions, then that labour will be utilized. Why deploy capital, when you can manage without doing so? As Anjor says, “Inhuman conditions are always justified through employment and occupation.” He explains that even though manual scavenging has been banned, the government is the largest employer of manual scavengers, mostly as cleaners of manholes and sewage systems. However, instead of employing them directly, their labour is contractualized to private companies. This is done on the basis of the assumption that a public-private partnership optimizes efficiency when the government’s focus is employment

rather than efficiency.

While pit latrines are privately owned, the sewage system is publicly owned, and so, even if the work is contractualized, the government must also be responsible. And yet, the moment the work has been contracted out, the government can wash its hands off the problem, and doesn’t have to provide a minimum wage or other welfare benefits. Technically, then, the whole system should be illegal.

Thanks to contractualisation, the ban is making them increasingly invisible. It is removing their presence from the official government eye that sees only sewers and infrastructure as

our taxes! So, often, the blame gets displaced elsewhere. (A good example of this can be seen in the 2014 movie *Court*, a Marathi film directed by Chaitanya Tamhane, where the blame for the death of a sewage worker is placed on an activist who is fighting for Dalit rights, by claiming that he induced the worker to commit suicide!)

But what does invisibilizing people mean? How can we give them a voice and help them break out of these structures that make it so difficult for them to make demands? Anjor Bhaskar believes that while it would be ideal if the entire waste disposal system itself changed, that seems unlikely,



Men have to climb into sewers with no protective gear.

Source: Safai Karamchari Andolan

the backbone of the urban shit disposal system, forgetting that these people are in fact the tendons that hold them together and connect them to many of our homes. If their existence is not even recognized, how can they fight for compensation or rights?

Moreover, if a death occurs, convictions don’t happen because it is tough to point fingers. A case against the government can take several years to be resolved because they have unending reserves of money coming from

so what is important now is for there to be awareness of and sensitivity to the working conditions that manual scavengers have to endure, as well as sensitivity to the environmental aspects of the waste disposal system. If policy hasn’t made much of a difference, perhaps awareness will. Equally and crucially important is the education and empowerment of the manual scavenging community themselves. Groups like ‘Movement for Scavenger Community,’ started by young



people from the manual scavenging community themselves, have created self-help groups for women and teach children reading, writing, and computer skills. Bezwada Wilson says that caste hierarchies have been internalized to such an extent, that even though nobody is happy in this job, they don't realize that they can revolt and fight back (interview with *Youth ki Awaaz*, January 2016). Perhaps by making them aware, and providing education and support systems that will allow them to revolt or make changes in their own lives, this internalization will be purged.

Moreover, when these communities are educated and given the opportunity to move out of such occupations, other castes will be forced to deal with the waste. This would delink the work from caste and those belonging to higher castes would demand better conditions. Anjor says that unfortunately, unlike with rag pickers, manual scavenging can't be solved through economics since there is no value associated with excreta. It needs to be delinked from caste in some other way.

We have to begin viewing manual scavenging as the systemic issue that it

is, rather than looking at it as the burden of a few. We are all contributing, we are all ignorant in our own ways, and finally it boils down to how much we really care about the waste our own bodies expel. If not the Dalit community today, someone else will do it tomorrow. As long as we don't find efficient, local solutions for the management of our waste, we will always have a system that deems someone low enough to clean our waste for us instead. When we start doing the right thing socially, we will also be doing the right thing environmentally. ■

Why waste?

One way of mending our wasteful ways is to make judicious use of it, making landfills a resource base

■ **SHIKHA MISHRA**

On June 21, 2016, the Central Road Research Institute (CRRI) declared that 60 per cent of the waste from the Ghazipur landfill can be used in the expansion of National Highway 24. According to the plan laid down by the CRRI, waste, especially plastic, would be segregated. This waste would then be used for filling the road instead of conventional mud, which is not only more expensive but also requires transportation over long distances. The plastic so segregated could then be used for generating energy.

Standing at an estimated 50 feet – the Ghazipur landfill is the oldest functional landfill in Delhi. Started in 1984, it spreads across 70 acres. A notice put up by the East Delhi Municipal Corporation (EDMC) outside the landfill apologises to local residents for its continued use. It states that the limit of 15 feet was overshot in 2002 and that it still receives 600-650 trucks full of garbage everyday. Presently, the landfill contains at least 12 million tonnes of waste with a daily addition of 3,000-3,500 MT.

Ideal landfills are carefully engineered structures that isolate the waste from the surroundings. They consist of a high-density polyethylene (HDPE) layer that separates waste from the natural soil and groundwater below. A leachate collection system, which consists of a sump, is where all the liquids that might be trapped inside

A notice put up by the East Delhi Municipal Corporation (EDMC) outside the Ghazipur landfill apologises to local residents for its continued use beyond 2009

the landfill are collected. A storm water drainage system is maintained to control run-offs during rains and storms, and there is a methane collection system wherein pipes are embedded within the landfills for safe collection and disposal.

The life of a landfill depends upon

the area, and more importantly, the weight of the garbage. The fact that three out of four landfills in Delhi that should have stopped working by 2009 are still functioning over and above capacity, defeats the whole concept of a scientifically managed landfill. "Due to the absence of a leachate treatment facility at Ghazipur landfill, by-products released during decomposition seep into the ground water," says environmentalist Bharati Chaturvedi. Overloading the landfills exponentially makes the geotextile sheets fail and the leachate percolates through it and contaminates the soil and groundwater. The fire at the Deonar dumping ground in Mumbai in March, 2016, lasted for four days. It exemplified the mismanagement of methane gas, a sight common at most landfills across India.

Theoretically, the waste that reaches the landfill must be segregated into municipal solid waste, construction and demolition waste, and inert landfill. But the waste most often received at landfills is mixed, and on piling, degenerates into methane. Experts assign the reason for overuse of landfills to urbanisation that has led to increased production of waste. Growing cities have aggravated the situation further due to unavailability of new dumping grounds. So, if the problem is urbanisation, would curbing it be the solution? Of course not, urbanisation in the name of development is inevitable, and so goes the vicious circle. ■



Pooping perfect

For dry waste toilets, ‘clean poop’ is no oxymoron.
Tamil Nadu school *Pathashaala* leads the way

■ CHAITANYA PATIL

On the surface, the prevalent system of “flushing and forgetting” seems very attractive, as it does not require us to take any responsibility for our own waste. In fact, the industry keeps coming up with newer designs of toilet bowls that don’t even require us to wash up after we’re done! Bowls these days come decked with the newest add-ons that wash (and perhaps even wipe?) our bottoms for us. The trend is to push our waste as far from ourselves as possible. Almost none of us are aware of where it goes, or of the fact that someday, someone else may have to deal with it.

The 900 cities and towns in India have an inadequate number of operational Sewage Treatment Plants (STPs). In an interview in December, 2014, the Minister of Environment, Forests and Climate Change, Prakash Javadekar said that 70 per cent of our wastewater goes untreated and most of it is released into rivers. By doing this, not only are we losing aquatic biodiversity at an alarming rate, we are also endangering human communities downstream who are dependent on that water.

The “flush and forget” system is unsustainable, because our cities and towns lack adequate infrastructure to treat the wastewater and, more importantly, due to our irresponsible water consumption patterns. A better understanding of our wastewater systems will greatly reduce the rate of pollution of our fresh water bodies and this will have a tremendous impact on the living standards of people who are directly dependent on them for their livelihoods. One way of doing this would be to abandon

flush toilets altogether, and adopt more sustainable models.

This has been done successfully at the Pathashaala School in Tamil Nadu, a small community of 120 students and staff members. The students and staff of this residential school have been using what they call a “dry composting toilet.” There are 32 such toilets at Pathashaala. One toilet unit consists of a western closet (WC) with two divisions for solid and liquid waste and a bidet for washing. This arrangement separates faeces from urine and stores it in sealed chambers where it then decomposes. The by-product of this process, a rich manure, is harvested twice a year and utilised for gardening purposes on the school campus.

This model was developed by members of the Pathashaala community. They experimented with different materials to build the body of the WC and settled on steel as the most workable alternative.

G. Gautama, Director-Secretary of Pathashaala, feels that a system like theirs has worked well primarily because of the small size of their community. “We started small in August, 2010 with 14 students and three teachers with

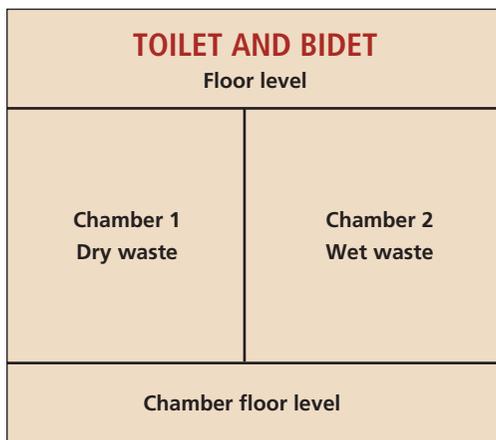


An alternative toilet in Tamil Nadu.
Photo credits: R K Srinivasan/CSE

none of them having used dry toilets before. Once we familiarised them with the new system, things went reasonably smoothly,” he adds. Pathashaala’s journey towards sustainability has had its own share of downs – one particular student decided to leave Pathashaala because he could not adjust to this arrangement.

Pathashaala School is just one of the many institutions dispersed across the nation that are adopting alternative toilets to solve their human waste disposal issues. Sadhana Forest, a community project based in Auroville, Pondicherry, uses similar dry composting toilets. In 2009, Bindeshwar Pathak, founder of the Sulabh Sanitation Movement, received the prestigious Stockholm Water Prize for developing a line of composting toilets.

The fact that modern flush toilets, so compact and sanitary in their appearance, are heavy polluters might be a tough truth to digest for some. It is, however, a truth all of us need to come to terms with. We spend a fair bit of our time on the toilet seat pondering over all that is wrong with this world. Perhaps it is time for us to spare a thought or two about our own waste, and mend our ways of dealing with it. ■



Collection and storage levels of the dry waste toilet at the Pathshaala school



across the subcontinent. Monkeys have also wreaked havoc across urban centres, even compelling the Members of Parliament (MPs) to release a joint advertisement in the newspapers inviting suggestions from citizens on the “management of monkeys and dogs in their residential areas in Delhi.”

When questioned about the human-monkey conflict in several parts of India, Dr. Iqbal Maliq, a renowned primatologist, observes, “Monkeys by nature avoid human contact. But when brought to cities, they become habituated to human interventions and start depending on people for food. Hence, when people refuse, they snatch, scratch and bite.” She believes that proper planning is required in order to control the monkey population.

The Prevention of Cruelty to Animals (Application of Fines) Rules, 1978 only prevents the export of monkeys for medical purposes. However, monkeys continue to be used for nuclear research and other testing purposes. “Creating a separate sanctuary for monkeys, planted with trees endemic to them, would be the most sustainable and effective solution,” says Dr. Maliq. Declaring monkeys as vermin would only lead to their mass killing, and make them more aggressive towards humans. “Leave them alone and they will leave you alone,” Dr. Maliq concludes.



Dr Iqbal Maliq

Gone wild?

“*Sahab*, I have taken a loan of Rs. 21,000 from the bank for farming this year. Yesterday, the wild boars came and destroyed all the crops in my field. How should I repay the loan now? If the bank confiscates my land, what should I do, *Sahab*? How will I earn anything?”



Photo credit: Vikas Choudhary/CSE

questions Bikhu, a farmer of Pachni village, Almora district, Uttarakhand.

Crop loss due to animal attacks are a common problem across the country. The Tamil Nadu Forest Department has given Rs. 1.8 crore as compensation to farmers whose crops were destroyed by wild boars. Three farmers from a village in Kendrapara district of Odisha were injured following an attack by male wild boars. The incident took place when farmers were engaged in cultivation of vegetables.

And it’s not just the boars. According to World Wildlife Fund’s (WWF) report, around 100 people are killed by elephants in India every year. Chandrapur in Maharashtra, also known as the ‘Tiger Capital of India,’ had several complaints of crop raids by wild boars and nilgai. The local forest department has culled a whopping 300 animals in the past few months. The official retaliation to this perceived menace is that of various state governments declaring these animals as vermin and issuing laws that allow their culling.

“The Environment Minister is writing to every state to kill whichever animal people want. In Bengal he gave permission to kill elephants, in Himachal, he gave permission to kill monkeys, in Goa, it was peacocks. I don’t know what is with the brutal killing of so many animals.” said Minister for Women and Child Development, Menaka Gandhi. She

has strongly protested the recent declaration of nilgai as vermin by the MoEF and allowing their culling for one year in Bihar after the state government had sought permission.

While it is necessary to address the concerns of the farmers who are already battling the odds, reactionary laws such as allowing culling, rather ‘killing,’ also need to be examined. Such knee-jerk reactions fail to see the problem for

The forest department, it seems, was bringing drugged monkeys from other places and leaving them in the forested villages

June 30, 2016 *Down To Earth*

what it is, which is that animals are encroaching because their land is also being encroached upon. The fight for land and resources are bringing humans and animals too close for comfort. So aren’t these animals also ecological refugees displaced from their homes? What should be noted though is that, on the human side, those bearing the brunt are also among the most vulnerable sections of our population.

Perhaps then, it isn’t so much a question of human versus animals as it is that of the deprived versus the privileged humans who are enjoying the bulk of the resources at the centre of the conflict. ■





Women working the field in Bachuabandh village, Chamoli. Photo credits: Phungreikhan Longvah

The Dying Breed

The youth of the youngest country in the world is unsure about its relationship with agriculture. What are the larger implications of this for the future of the country?

Nirmala Devi, a 27-year-old fiery, non-nonsense mother of two boys says curtly, “*Agar padh lete toh aap ki tarah shahar na chale jaate?*” (If I could have studied, then like you, I too would be living in a city). With the backdrop of the pristine, rain-washed Himalayas behind, she adjusts her green *duppatta* and speaks on. She narrates the lack of colleges and health services where she lives – Bachuabandh village, block Gairsain, district Chamoli, in Uttarakhand – quickly adding that she





does not need much health intervention and that the school, where her children study, is right round the corner. The temperature never goes over 30 degrees here, but Delhi still is an aspirational city for her and many like her.

It's sowing time. Rice saplings are being transplanted. Women are busy in the water-laden fields. Most men, especially young ones refuse to go the field. Women have taken it upon

themselves to take the drudgery of feeding the family and the nation, too. More and more women are seen as farm labourers. Randheer Pratap Singh, a young engineering student and farmer from Punjab says, "Even five years ago there weren't so many women coming from Jharkhand and Bihar to work in our fields. Now we see more women than men coming as labourers."

As per the National Sample Survey Office (NSSO) of Government of India's report published in the year 2013, the farming sector contributed to 17.9 per cent of the country's Gross Domestic Product (GDP) in 2015, while for the agricultural year July, 2012-June, 2013, rural India had an estimated total of 90.2 million agricultural households (about 57.8 per cent of the total estimated rural households).

And yet, agriculture has come to be associated with poverty – a last resort of sorts. Parvati Devi of Pachni village, home to about 30 families in block Chaukhatia, Almora district, points to her son, "He doesn't want to do farming. He would have left for the city had I not been unwell." Youth in Uttarakhand, especially young men, with some schooling, leave behind their farms and fields and head to the city.

"Small landholdings, lack of water, difficulty in acquiring finance and insurance, and lack of proper post harvest linkages to the market is the reason," points out Jagdeeshji, a field coordinator from one of the several non-profit organisations working in this village. "They would rather work

as labourers in the nearby city but not want to till their land."

Neelima Devi, another farmer in the neighbouring village of Chinoni points out, "Agriculture is no longer viable. The urea, the seeds, and labour, are expensive. Finally, the Minimum Support Price set by the government is very low, making it unviable."

Biraj Swain, an expert on international development and global food policy refers to the 2014 Global Hunger Index Scores by Severity to say that India is in the serious zone of food security along with countries like Burkina Faso, Tanzania, Indonesia, and Cambodia and some of our neighbours like Pakistan, Bhutan, Nepal, Bangladesh, and Sri Lanka.

Hindustan Times, on March 8, 2016 reported, "Over the past 15 years, Uttarakhand has been unable to improve its agricultural growth, though the majority of its population and area are still classified as rural, and the state government has a record of nearly 100 per cent spending of its budgetary allocations." The situation is even worse in Punjab, the food bowl of the country that turned to cash crops bringing with it a huge dependence on ground water. "The land is parched and water is saline as digging deeper and deeper brings in less water each year," say Randheer Pratap Singh, whose farmland is 10 km from Patiala.

Agriculture has for centuries been the backbone of India's economy, but times are changing. Mensha Goswami studying rural development in Guru Ghasidas University, Chattisgarh wants to keep her land of 110 acres in Guna village, Mungeli district. "Labour is expensive and locals are reluctant to till the agricultural land as they subsist on rice and other food items supplied by the Public Distribution System (PDS) of the state. I am learning about Integrated Crop Management (ICM) in college. If I can earn enough money, I will invest there. Till then, I will work in Delhi and continue to lease out my farmland."

My family is dependent primarily on agriculture. Now, we do not have the money to invest in our land. When I have the money, I will do integrated organic farming

Mensha Puri Goswami, 19 years
Studying to be a rural technologist
Farmland of 110 acres in
Guna Village, Mungeli district, Chattisgarh





Traditional farming practices of Pachni village, Uttarakhand. Photo credits: Phungreikhan Longvah

The ICM system is fast emerging as the new financially viable and environmentally sustainable option. As the name suggests, it is a balanced approach that integrates both modern and traditional ways of farming by promoting indigenous seeds and techniques, while limiting the use of fertilisers and high-yielding seeds to controlled amounts. The aim is to minimise dependence on purchased inputs, while maximizing on traditional technical knowledge and land use systems.

Seed conservation is an integral part of ICM farming, as are rainwater harvesting techniques and modern water management systems such as drip irrigation. Some NGOs in Uttarakhand are working with farmers to adopt the ICM system of farming.

This reveals a much darker side of the story. As per the Census of India (2011),

Our land has been leased out to small farmers. They take a share of the produce and give us the rest. During festivals and harvesting season, we go to our farm, but my father visits it on a regular basis. I want to keep the farm and introduce new methods, but I do not wish to live in the village

Pooja GK, 22 years
Studying to be a lawyer
Farmland of 25 acres in Kannur,
Gulbarga district, Karnataka

more than 50 per cent of its population is below 25 years and 65 per cent is below 35 years. With an increasing number of this population moving away from agriculture (as the educated youth want to leave because they don't see a future in agriculture), the sector cannot

revive if the youth don't want to stay.

Migration has been an especially acute problem in Uttarakhand. In Mensakhet village in Almora district, gram panchayat member, Dhangiri, about 75 years old confesses, "The youth of this village is no longer interested in farming. They are more inclined towards going to the big cities and doing small routine jobs. They also aspire for a better future, which is impossible if they live in this village and limit themselves to farming, alone." This hilltop village is inaccessible by road, with the nearest school approximately 5 km away. With the lack of civic opportunities and economic incentives, farming is no longer seen as an 'in' thing to do.

Traditional roots to modern methods in Uttarakhand

The farmers of Uttarakhand, for the most part, still follow indigenous methods. The average size of holding



in the state is around 0.98 hectare. Agriculture, livestock, forestry, and animal husbandry provides them with opportunities to make optimum use of the resources available. Chemical-based agriculture is limited here and most of the farming is done using organic methods. The traditional methods here, however, only fulfill the basic needs of subsistence.

In Bachuabandh, a remote village in the Chamoli district, 60-year-old Vimala Devi says, “There are no basic amenities in this village. We do not have knowledge regarding marketing of the crops. Children have moved to cities for higher studies and then they are settling there only. But I will not leave since I have stayed here all my life.” Modern agriculture has not reached these villages, making villagers dependent on traditional sources of farming. Small land holdings, difficult geographical terrain, and high cost of transporting modern technology, has impeded ‘development’ to this region.

Various NGOs, often working with the state government, are bringing the farmers closer to modern methods of farming. Some farmers are starting to use high yielding varieties (HYVs) of seeds sold by these organisations and are adopting methods like the system of rice intensification (SRI) as opposed to the traditional broadcasting (sowing and planting) methods. These NGOs are also working on seed conservation, hence trying to strike a balance between indigenous methods and new technology. The SRI system involves one

The land is on slopes amidst a large expanse of a mango orchard. This attracts wild boars and monkeys. They raid our farms. I would like to continue as a hobby but never as profession

Shrikant Chavan, 22 years
Studying to be an engineer
Farmland of 10 acres
in Rajapur, Konkan, Maharashtra

The science of tradition

Traditional farming practices are often spoken of in contrast to modern ‘scientific’ methods. However, there is a great deal of science behind them. Indigenous agriculture has evolved over many millennia and is an amalgam of traditional knowledge, geographical specificities, and individual innovations.

The farmers of Uttarakhand, for instance, classify and characterise different kinds of soil based on their experience and understanding. Dark-coloured soil is considered to be more productive in terms of yield, while fine textured soil is reported to be better at water-holding capacity. The presence of the earthworm, known as *kitaul* in local dialect, is a sign of productive soil. The main source of fertilizer for the soil in these areas is manure from animals like cows and buffaloes. These animals not only provide them with milk and help in ploughing the land, but also help in increasing the fertility of the soil with their excreta. The manure is then spread in the fields and mixed with the soil at the time of ploughing.

In some areas, ash dust, obtained from burning fuelwood, is mixed with the manure and applied to the field. This practice is quite common where vegetables like potatoes are grown. The manure improves the fertility of the soil, while the ash provides the soil

with phosphorus. The farmers leave half their field uncultivated in the Rabi season to let the soil replenish its nutrients, and higher value crops such as potato and chilly are then grown in the Kharif season on that part of the uncultivated land. In parts of the field where wheat was grown in the Rabi season, crops like *mandua* (finger millet), *gahat*, and *bhatt* (black beans) are sown in the Kharif season, to regain soil fertility.

In the village of Bachuabandh, Chamoli district, farmers grow indigenous crops like *gadheri* and *tuar*, as they feel that these crops do not need much care. Some of these crops are hardy and leguminous and help in fixing atmospheric nitrogen to the soil. These crops increase productivity of the soil and thus, every field is left fallow once in two years and within this time period, crops grown on the field are rotated.

Various indigenous cultures view land not as a commodity to be bought and sold, but as something with sentiment and their identity is attached to it. The loss of cultural identity is an integral connecting piece in the decline of agriculture and the receding interest among the youth for it. For more reasons than one, the study of traditional agriculture has become very important in order to seek alternatives to modern techniques and evolve sustainable eco-friendly strategies for agricultural development.

variety being planted on a small piece of land. This is later transplanted onto a larger plot of land in neat, well-spaced out rows with furrows. The spacing out makes manure application and weeding easy and allows drip irrigation as well.

Adopting the ICM approach could be especially beneficial for farmers in Uttarakhand, as this method is supposed to be particularly useful for the need of farmers with small landholdings. The small plot sizes makes it easier to practice a mixed style of farming that

includes growing indigenous, local crops and mainstream, high demand crops, like wheat and rice, as well as balancing the use of fertilisers with manure. Also, keeping input costs on fertilisers low is the only financially sustainable option for small farmers. Becoming completely dependent on fertilisers would mean their input costs would spiral out of control.

In Pachni village, Almora district, many farmers are using these methods with the hope to get a better yield. “I now



बोझ की खेती

उत्तराखंड के बछुआबाण गांव की कहानी हमारे सामने एक अलग पहलू पेश करती है। ये गांव चमोली जिले के अंदर आता है। इस गांव में कुल 25 परिवार रहते हैं। आज हमारे सामने पढ़ाई-लिखाई को लेकर एक नई चुनौती खड़ी नजर आती है। 20 वर्षीय कमलादेवी से बात करने पर एक रोचक तथ्य सामने आया, उन्होंने कहा- "अगर मैं पढ़ी-लिखी होती तो यहां गांव में क्यों होती? मैं भी आपकी तरह शहरों में होती और कुछ और काम कर रही होती। उसकी ये बातें सुनकर मेरे अंदर एक नई धारणा का विकास हुआ। गांव के जो लोग पढ़े-लिखे हैं, वे वापस अपने खेतों में उतर कर अपने हाथ पांव गंदे नहीं करना चाहते। वे शहरों की ओर अपनस रुख कर रहे हैं। गांव में बहुत सी सुविधाओं का न होना और जीवन व्यतीत करने के लिए अनेक कठिनाइयों का सामना करना ही उनके पलायन का प्रमुख कारण है। और युवाओं का पलायन ही महिलाओं को दिन-रात घरों और खेतों में काम करने पर मजबूर कर रहा है।

महिलाओं की इस स्थिति का एकमात्र कारण है उनकी अशिक्षा। अगर वह शिक्षित होती, तो शायद उनकी स्थिति इतनी दयनीय न होती। 47 वर्षीय नीला देवी अपना 30 साल

बछुआबाण गांव की नीला देवी अपने घर का काम निपटाने के साथ ही खेतों पर जाकर भी काम करती हैं। फोटो: श्रीकांत व्हान



का अनुभव बांटते हुए बताती हैं कि "वे सुबह से उठकर, घर का पूरा काम निपटाकर, गाय-भैसों को भी चारा डालकर, बच्चों का ख्याल रखते हुए खेतों में कार्य करती हैं"। नीला देवी से यह पूछने पर कि क्यों पुरुष वर्ग आपके साथ हाथ नहीं बंटता, तो उन्होंने बताया-"गांव के पुरुष बस हल चलाते हैं और थोड़ी बहुत गुड़ाई में मदद कर देते हैं। पुरुषों की यही मानसिकता है कि वे जो कार्य करते हैं उनमें ज्यादा परिश्रम करना होता है"।

कृषि अर्थशास्त्र संशोधन केंद्र, दिल्ली 2013 की शोध में पाया गया है कि उत्तराखंड के कुल 36.9 प्रतिशत मजदूरों में से 27.1 प्रतिशत महिलाएं हैं। यह आंकड़ा भारत के अन्य राज्यों की तुलना में कहीं अधिक है। पंजाब, हरियाणा, बिहार, उत्तर प्रदेश जैसे अन्य राज्यों में भी महिलाएं कृषि एवं मजदूरी का काम कर रही हैं। परंतु वे पट्टी की हकदार नहीं हैं। इन राज्यों में विगत 5-10 वर्षों में ही पाया गया है कि महिलाएं घरों से निकलकर बाहर खेतों में कार्य कर रही हैं, लेकिन उत्तराखंड में तो यह प्रथा वर्षों से चली आ रही है।

उत्तराखंड में बछुआबाण गांव की परिस्थिति कुछ इस तरह है कि जब कमला देवी से स्वास्थ्य संबंधी जानकारी मांगी तो उन्होंने बताया कि "गांव में केवल एक ही अस्पताल है और वहां भी डॉक्टर महीने में केवल 10 दिन आता है।

यही कारण है कि शिशु एवं गर्भवती

महिलाओं की मृत्यु दर दिन-ब-दिन बढ़ती जा रही है"।

स्थिति इतनी नाजुक हो चुकी है कि

60 साल की पार्वती देवी भी इसकी चपेट में आने से न बच सकी। अपने बेटे द्वारा लिए गए उधार को चुकाने के लिए वह भूखी, असक्षम मां दिन-रात खेतों में काम कर रही है, लेकिन उसका बेटा उन कमाए हुए चंद पैसों को भी जुए और शराब में उड़ाए जा रहा है। किसी तरह वह 50,000 रुपये चुकाने में सफल हुई, लेकिन बाकी के 15,000 रुपयों के चुकाने की संभावना बहुत कम है। बैंक भी उस बेचारी के सामने मुंह फाड़े खड़ा है। अगर वह 15,000 नहीं चुका सकी तो उसकी छोटी सी जमीन भी उससे छिन जायेगी, जिससे वह अपने परिवार का पेट भर रही है।

मुझे ऐसा महसूस होता है कि इस सामाजिक समस्या का अंत युवा वर्ग को कृषि से जोड़े रखना और उनका पलायन रोकना ही है। जरूरत से ज्यादा पलायन होने के कारण आज महिला समूह काफी परेशानियों का सामना कर रहा है। युवा तबके को कृषि से जोड़े रखने के लिए हमें हरसंभव कोशिश करनी पड़ेगी, वरना हम इस दलदल में और गहरे धंसते चले जाएंगे।



The mass migration

“*Yahan gaaon mein kya rakha hai?* (what value is there in village life?), said Padmal Devi, a 46-year-old farmer from Bachuabandh village, Chamoli district, Uttarakhand. This is a phrase commonly heard in this state where rural-urban migration has become a pervasive problem. Although particularly grave here, the situation across India is no different.

Access to higher education is difficult in villages. Those who have the means to acquire it, leave for good educational institutions in the cities. They find work in urban centres and rarely come back. Padmal Devi continues, “My three sons are studying in Dehradun, Haridwar, and Srinagar. After this, they will find job security in the city, which they would not have had in farming. I don’t expect them to come back.”

The small size of land holdings that do not yield enough income to support the entire family is another reason why

farmlands are abandoned for the city life. Ashokji, 46, a plumber in Delhi, is from Rajkanka village, Kendrapur District, of Odisha. The size of his rain-fed agricultural land was simply not sufficient to support his family. “Now I work here and can visit my family only once a year,” he said.

This migration is of people looking to find work or better living conditions. Deepak Kumar, 26, a daily-wage labourer had migrated to Delhi from Samastipur, Bihar, with his father when he was eight years old. Even his electrical engineering degree has failed to get him a good job, “My daily-wage work brings me only Rs 350 per day.”

The urban population of the country has boomed over the years, spurred on by the increase in rural-urban migration. This is also posing sanitation and infrastructural challenges, traffic congestion due to narrower roads, and lack of employment opportunities, eventually leading to unemployment and poor living conditions. The chain reaction that begins with decline in agriculture seems to wind its way to corresponding urban issues as well.

Ours is a monoculture farm and dependant on monsoons. We grow grapes that are heavily sprayed. I would never eat the produce of my farm. The government gives pesticides and seeds and we sow. We thus have no choice but to continue. Farm hand is expensive – Rs 300 per day and very difficult to get. Earlier my uncle could employ labour; now he works as a labourer in other peoples’ farms

Lokesh Sinram, 23 years
Studying to be an engineer
Farmland of 8 acres in Odaipatti Village,
Theni District, Tamil Nadu

practice row farming; it gives adequate space for my crops to grow and is easier for weeding,” says Avtar Singh, who has been using this method for a year now. Farmers like him do not use any machinery for ploughing and still believe in using cow dung as manure. They also want other farmers to start practicing similar techniques as they are quite satisfied with the results.

“Introducing new forms of seeds and technologies has enabled the farmers to increase their output without much use of chemicals,” says Inder Bisht. He also said that “under new methods of farming we are introducing services like value adding, market linkages, rural entrepreneurship education, and managing and teaching the human-techno interface.”

On the contrary, Surender Singh’s family has been into farming for five to

six generations. He uses his own seeds and does not use SRI method. Many farmers like him will wait to see the result of the modern methods being used by others before incorporating them. For irrigation they depend on rain-fed streams nearby. Rice and wheat is grown widely, for both household consumption as well as for the market, along with *daal* and some indigenous vegetables like *ghaderi* (*Colocasia esculenta*).



Inder Bisht explaining SRI method. Photo credits: Phungreikhan Longvah



Agricultural festivities

The idea of community is central to the celebration of festivals. They have evolved over many centuries, and are deeply shaped and informed by agriculture, its practices, and its related seasonal changes. Various local cultures can be traced through the festivals, music, and dance forms that have grown out of them. However, with a rapidly urbanizing population and the severing of the urban citizen's connection to land and agriculture, most of us are unaware of the origin of the festivals we celebrate, and how they are linked to agricultural seasons.

Festivals survive in the urban centres in a more commercialised form, stripped of their significance and far removed from their origin. For those who remain in the villages, their sense of community pride is chipping away. To remind us urban youth of our origins, we explored some of the festivals we celebrate but know very little about.

When asked about why they celebrate Harela, the general response from the people of the village of Bachuabandh, Uttarakhand, was, "*Parampara hai isiliye karna padta hai,*" (We do so because it is our tradition). Leela Devi, 51, said "Who cares why it is celebrated? We only celebrate it because the elders in our family would do so." Her two sons, who live in cities, Dehradun and Haridwar, find it difficult to come home for festivals.

Harela, or Hariyali, which literally means 'day of green', is a community festival from the Kumaoni region of Uttarakhand. It is celebrated thrice a year by the local communities to mark the beginning of the sowing cycle and the onset of the monsoon season. It is meant to be a prayer for a good harvest season. Either seven or five types of seeds are sown – mainly *madwa*, *dhaan*, *bhatt*, *makka*, *soyabean*, *urad dal* and *junool* – ten days before the festival.

On the day of the festival, idols of Lord Shiva and Parvati are worshipped and a mock wedding is held, following which the yellow leaves from the seeds that were grown are put onto the ears of the idols. Some people also sow the same seeds in their respective agricultural lands in order to offer their worship.

The popular festival of Baisakhi, or Vaisakhi, is celebrated as a harvest festival in Punjab. It falls on the first day of the month of Baisakh, which is the first solar month according to the Punjabi calendar. It marks the new year and the start of a new harvest season.

In Tamil Nadu, Pongal is celebrated to mark the start of the sun's six-month journey northwards. It is also meant as an act of conveying gratitude to the sun for providing the energy for agricultural activities. Then, there is the festival of Ellamavasya, which is celebrated in Karnataka, Andhra Pradesh and Telangana. It is observed during the new moon, in the Margashirsha month, between December and January. On this day, farmers prepare special food to offer to Mother Earth. An important ritual of this festival is the spraying of sesame and jaggery on the fields because of the belief that they are food for the worms in the farmland.

In Maharashtra, the festival of Pola is celebrated to worship the cows that plough the farmlands. People decorate the cows, adorning them with beautiful ornaments. In the Konkan coastal region, Narali Poornima is celebrated, where the fishing communities offer their prayers to samudra (sea) and varuna (rain). This marks the beginning of monsoon in the region.

The festival of Nuakhai, or Nuankhai, is celebrated to welcome the new rice of the season. It is celebrated in the month of Bhadrapada, and is an important social festival for the people residing in Odisha, especially in the Western region of the state.



Bangles around a tree branch, a way of worship in Ambegaon Vandev Devral, Maharashtra. Photo credit: Preeti Singh/CSE





A farmer in Punjab transplanting paddy saplings for the Rabi season. Photo credits: Vikas Choudhary/CSE

Lessons from Punjab

The “Green Revolution,” was introduced in India to make the country self sufficient in food production. Punjab, the land of five rivers, was transformed into the bread basket of the country. Soon the yields increased and India could meet its food needs. But the land was wrenched of its nutrients and turned bone dry as extraction of water was a must for the chemically laden, high yielding varieties of wheat and rice production. Gradually, the yield of the land decreased and the land became unproductive.

In the book *Critical Perspective on Agrarian Transition*, Dr Sukhpal Singh and Smriti Bhogal of Punjab Agriculture University, write in the chapter ‘Punjab’s small peasantry: thriving or deteriorating,’ that 88 per cent of the farmers of Punjab have an average debt of Rs. 218,092 per household. The amount of debt per hectare was inversely related to the farm size. It was the highest among marginal farmers at Rs. 1,70,184, followed by small farmers at Rs.1,04,155 and for larger farmers at Rs.44,069.

“The agricultural crisis in Punjab is deepening. The groundwater table

is reducing by 2 feet every year, the usage of NPK and other fertilisers are increasing, the indigenous seeds are losing their identity, soil is getting polluted, health and safety issues are increasing,” says Randheer Singh Pratap, who has been farming for the last 20 years. With deteriorating soil, the only way to maintain high yields is to pump in more fertilisers that further deplete the soil, while also increasing the input costs for the farmers.

The youth in Punjab, like in Uttarakhand, are migrating to cities far away from home. Once the bread basket or food bowl of India, it has now become inextricably dependent on chemicals to produce high yields. The Green Revolution of 1970, brought to India by Norman Borlaug may have been needed then but now a new Green Revolution is needed: sow native, eat local, and understand the ecosystem before intervention.

Worldwide, the main challenge today is the decline in productivity of land in the agricultural sector and a growing demand to accommodate the increasing population. What is needed are ways to grow more food without heavy reliance on environmentally

costly chemical pesticides, fertilisers, and irrigation water. However, the new methods that are being developed to increase productivity of crops do not come with sufficient research on their long term effect on soil fertility and ecological balance.

Probably we need a Manoj Kumar to make patriotic films of the 1960s or may be instead of Sharukh Khan finding solution in *Swades*, we would need to look for local Sharukhs who will leave their well paying jobs to return to their villages to make a change. Or may we need more of young people like Mayank Jain, an engineer from a premium institution of this country, growing onions in Gaya district of Bihar, engaging with villagers through community farming in one of the poorest districts of this country. It’s time, perhaps, like in Sri Lanka, India should also have a subject of agriculture in schools and colleges to make agriculture the ‘in’ thing to do. ■

Rishabh Shrivastava, Ajay Pratap Singh, Phungreikhan Longvah, Shikha Mishra, Mensha Puri Goswami, Akshata Verma, Sharad Tanaji Zagade, Pooja GK, Rohini Deb



Like Land, Like Culture

Does the secret to sustainability lie in geography? Is preserving our culture the answer to saving the environment?

■ VAIBHAV BHATIA

With sustainability taking over as the 21st century ‘mantra,’ we are all called upon to introspect and evaluate our lifestyles and everyday choices. Culture inevitably takes the centre stage in the discourse of sustainability. Especially in India, the march towards sustainability can safely draw lessons from age-old practices that are central to the diverse regional cultures of indigenous communities residing in rural areas.

To deconstruct the culture-sustainability symbiosis, 5waraj, a non-governmental organisation for the preservation of indigenous practices, has identified five elements that capture this relationship. They include Dialect (*Bhasha*), Diet (*Bhojan*), Dress (*Bhesh*), Dwelling (*Bhavan*), and Dance/Music (*Bhajan*). Together they not only reveal the identity of a community but also form a sustainable and ecologically

sensitive system.

Gourav Shorey – founding member of 5waraj, explains that the classification is based on the geographic peculiarities of a place, that inform the culture of the local community. To better understand the deep-seated elements of sustainability in culture and lifestyle, we chose the two villages of Pachni (Almora district) and Bachuabandh (Chamoli district), in Uttarakhand.

Dialect or *Bhasha* is the most significant element and is the foundation for the other four elements. The word ‘dialect’ comes from the Ancient Greek word *dialektos*, meaning “discourse or language.” Dialect is a gift unique to humans that allows us to communicate and socialise. It differentiates us from the primates. Specific to each geographical region or hamlet, dialects make use of symbols and words as tools for communication. They are also intrinsic to the expression of cultural and linguistic diversity.

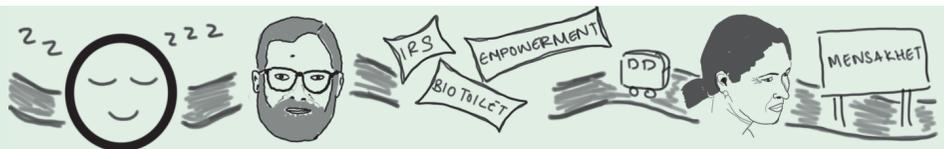
Closely related to culture, it is a means by which values, beliefs, and customs of different communities in a region can be communicated.

Climatic and physiological factors have played an important role in the evolution of local languages. They are a key to environmental conservation, since local dialects have special linguistic features that can often describe regional or local environmental phenomenon with ease. Kumaoni and Garhwali are used as the regional dialects in the villages of Pachni and Bachuabandh respectively. These dialects foster feelings of group identity and solidarity amongst the local people of these villages, and are significant in conveying and preserving their shared traditions and culture. Even their engagement with the social, cultural, physical, and economic environment is governed by their regional dialects, making it central to their identity, continuity, and sustainability.

Another important element of culture is Diet. The diet or the local staple food of a region speaks of the health and wellness of the people and more importantly, it echoes sustainability and ecological harmony. Diets have evolved over time to keep in sync with the local ecosystem. Traditionally, the locally grown food which is cooked in local styles, helps to reduce human dependence on energy intensive technologies and systems. Consumption of local crops keeps immunity levels high during seasonal fluctuations and transitions. People in both Pachni and Bachuabandh villages, eat a uniform diet that consists of *chappatis* with a seasonal vegetable for breakfast, pulses and rice for lunch, and once again *chappatis* and vegetables for dinner. Certain local crops include pulses such as *kulath* (*geth dal*), which is made by grinding it into a paste using



Home grown peaches in Bachuabandh village, Uttarakhand. Photo credits: A Harshita



local tools and then boiling it for hours, and *bhat dal*, prepared by treating it with oil, flour, and hot water. Soyabean *dal*, *rocesh lobiya*, and *johee (kaadi)* are a few other indigenous crops. Interactions with the Bachuabandh villagers revealed that leaves such as *ramdana*, *bedu*, *bicchu ghas*, and *arbi*, rich in iron and vitamins formed the staple food of the villagers in earlier times.

The significance of Dresses as our 'social skin' transcends time, culture, and geography. Every cloth, drape, silhouette, and style is deeply influenced by both culture and climate. As for culture, be it the Punjabi turban, the South Indian *veshti*, or the colourful *lehnga-choli* adorned by Rajasthani women, these attires reflect the rich diversity that seeps from one generation to another. Climate and geography impact clothing, making them inherently sustainable. Local dresses are made from different local fibres for different seasons using various tailoring techniques to keep people comfortable around the year. For example, women in Pachni and Bachuabandh villages have a tradition of wearing *sarees* with full-sleeved blouses and a covering over the head called *paranda*. However, with increasing temperatures lately the women now prefer wearing salwar suits instead of *sarees*, with lesser use of *paranda* to cover their heads. Clothing is found to be extremely sustainable when adaptive to climate, geography, and physiology of a region.

Dwellings or houses are an outcome of all the above elements i.e. dialects, diets, and dresses of a community. The design, materials used, and the construction of a house must be in harmony with the local micro-climate in order to be sustainable. A dwelling's demand for energy, raw materials, and water depends largely on the climatic context. The design of a traditional dwelling incorporates protection of its immediate natural surroundings; the extent of conservation varying with how integrated the environment is in the local dialect. The raw materials used are the ones locally available and less vulnerable to loss during climatic

hazards. Traditional dwellings, with an environmentally conscious design, keep people comfortable and safe without high energy consumption and environmental exploitation. With the advent of comfort-based technology, this traditional sustainability has been sacrificed on all fronts. The dwellings of Pachni and Bachuabandh take into consideration heat, wind, humidity, frost, and other such factors, making optimum use of energy. The rural settlement along the hill comprises of clusters of small *kuccha* houses and huts with thick mud walls, thatched roofs, and small openings for entry. Most houses were found to be of similar size, shape, and detailing. Amongst the few concrete dwellings found in the area, stone was identified as the primary raw material. Dwellings with sustainable and climate-proof architecture also reflect a set of varying physical and non-physical determinant forces such as climate and geology, religion, socio-cultural values, economics, technology, and administrative factors of the region.

Carrying fodder from the forest.

Photo credit: A Harshita



For a sustainable future one needs to re-familiarise oneself with this system and its constituent elements, simply because an imbalance in any one of these elements will lead to the collapse of the social construct of the local environment

The connection between celebratory dances/songs and sustainability may not seem very direct. However, this fifth element Dance is indispensable in defining both cultural and environmental sustainability of a region. Any religious festival, social occasion, or cultural gathering is incomplete without music and dance. The lyrics, tunes, and dance moves reflect ancient culture, reveal traditional beliefs and practices, and celebrate every aspect of the environment in a pious and participatory manner. They also codify methods of environment preservation that are passed on generationally. The changing seasons, the time for sowing and harvesting crops, the lunar cycles, etc. are all

captured in folk songs and dances. A famous folk song of Pachni village, '*Kaile Baije Moruli Ho Baina*' ('Someone heard Murli's voice and instantly fell in love with him') is a religious song. Whereas '*Jau Liyo Pairi Panchami Ka Sala*' is a celebratory song of Bachuabandh village sung on Basant Panchani, marking the arrival of the spring season. Music and dance are therefore inextricably linked with the sustainable local culture and systems of traditional knowledge.

Between the blues and greens, these five essential elements of sustainability emerge, all intertwined. These elements need to be recognised, revived, and adopted to meet the present demands of sustainability in the larger context. ■





A mud house in Paradip, Odisha. Photo credit: Agnimirh Basu/CSE

From earth, arose a mud house

Reliving and reimagining the tradition of mud houses

■ DEEPTI SAMANTARAY

All of a sudden I felt my nostrils fill up with the peculiar *saundhi mehak*, or the smell of wet earth – it drenched my soul. Oh well, it wasn't raining! I was actually in a class during my month-long course at Centre for Science and Environment (CSE), where Saurabh Phadke, architect and teacher, was talking about mud houses. Childhood memories of summers spent in mud houses at my paternal village in Odisha came flooding back.

I feel privileged to boast about my experience with mud houses to my city-dwelling friends who have never seen one. I will forever love our mud house that had *Chita*, *Maruja*, and *Jhoti* designs made on it with rice paste. One could always feel the cold walls and floor while sleeping and smell that peculiar smell of the soil.

As a child, I never understood that those who live in mud houses do so due to financial constraints. With the passage of time, the mud house was gone part by part and a *pucca* house proudly replaced it. Now the only part of the mud house that was left was the one used as a cattle shed. I was heartbroken that my precious asset had been razed to the ground, back to the earth whence it came. I grew up 'smart' enough to understand that mud houses are for people who cannot afford a *pucca* house.

Mud has been used in different corners of the world to build extraordinary pieces of architecture, ranging from 1,000-year-old *ksars* (forts) in Morocco to 6,000-year-old arches, vaults, and domes in the Nile Valley. Designer builders like Meror Krayenhoff have assisted many people like Randy

Bachman, an Australian singer, to build beautiful rammed earth homes. In our own country, the Kerala government and the Housing and Urban Development Corporation (HUDCO) jointly financed the construction of more than 1.4 lakh mud houses in the state – 70 per cent of them in rural areas. The term 'earthen building' incorporates a number of methods like rammed earth, cob, adobe, ferro, cement, straw bale dwellings, bamboo, and thatches for the ceilings.

The houses made of mud are naturally insulated, such that they are cool in summers and warm in winters. Their strength depends on how well they are constructed and they are resistant to earthquakes. Earth houses are best projected as a community project for villagers to make them self-reliant. When it comes to the cost, it is only a fraction of what we spend on conventional modern house construction.

But, in India, mud houses have increasingly come to be associated with the less privileged class. Our demand for houses range in millions. Of course, mud houses cannot be built to fulfill the entire scale of demand but at least if it caters to a fraction, it will still be a great achievement. In a country that boasts of its rising Gross Domestic Product (GDP), large numbers of people continue to sleep on footpaths. At least mud houses can be built in dry climates and in places where local sustainable resources are available, gaining the twin benefits of building green houses and of solving the problem of housing.

Soon, I shall build my own mud house, and then I will share my experiences of living in a mud house again. After all, it's high time we shed the social stigma associated with mud houses. ■



Gen-Z Farming

Lessons from our grandmothers could be our modern-day solutions

■ G JAMUNASHREE

Urban farming, if explored at its full potential, may revolutionise the traditional system of food production and help disperse the mounting pressure on India's agricultural lands. It has emerged as an extremely viable option in the 21st century, and needs to be better recognised and promoted.

Urban farming is generally of three kinds: rooftop farming, institutional farming, and community farming. These further bifurcate into other sub-types. In India, loan schemes proposed by Prime Minister Narendra Modi for small businesses like urban farming, providing upto Rs 10 lakh per plot (2015), are quite unknown to city dwellers. Other funding schemes by banks incentivise the building of greenhouses and hydroponic farms that operate with perfectly balanced, pH adjusted nutrient solution, and so on.

Local varieties of both vegetable and herbal plants may be preferred as per the region. Tomato, brinjal, drumstick, and curry leaves are among the common vegetables in South India, which are grown year round. My grandmother's backyard is



Setting up of rooftop gardens



A rooftop garden in New Delhi.

Photos: Vikas Choudhary/CSE

replete with plants such as *tulsi*, Indian borage, *adhatoda*, aloe vera, cluster beans, broad beans, snake gourd, nightshade berry, and fenugreek leaves. These sufficiently meet the family's everyday requirements and are also safe, healthy, and fresh. The home-produced manure used for urban farming, generated from wet kitchen waste, is highly fertile.

But is this enough to meet the issue of good security?

Goal 1 of the United Nations Millennium Development Goals, aims at eradication of extreme poverty and hunger. With a teeming population of 1.25 billion, India faces an uphill task in meeting this challenge. It ranks high among countries with an undernourished population, proportion of underweight children below ages three and five, and infant mortality rate.

In addition to the population pressure, developing countries such as India are also bogged down by bad infrastructure, with poorly maintained roads and transportation facilities, and inadequate cold storages causing 10-30 per cent loss of post-harvest produce in transit itself (Food and Agriculture Organisation Report, 2005). As per the Agricultural Census of 2011, the Large Agricultural Lands (10-20 ha) in India have reduced by 66 per cent and Marginal Lands (0.5-1 ha) have increased by 146 per cent. The reduced land holdings have only worsened their condition.

Farming in our ever-increasing urban and peri-urban areas can ensure availability of affordable, safe, and healthy food to poor families and take pressure off traditional farmlands. Additionally, urban farming helps make cities sustainable socially, financially, as well as environmentally. Even the wastewater of the urban cities is better recycled and reused in farming rather than processed at poorly functioning, overloaded water treatment plants. ■



Of herbs and habitats

A discovery of Uttarakhand's many natural treasures, both from the wild world and from the human

■ REENA JOY & AISHWARYA VARADHARAJAN

As we look back on our trip to the Jim Corbett National Park and the three villages spanning the Almora and Chamoli districts of Uttarakhand, we realise that something has subtly changed in the way we look at the bounties of nature. We came out of the forest completely satiated by our new discoveries. The villages, too, offered us an insight into how significant the ecology around them is in the daily lives of the local communities; something our urban lives have never taught us.

We went to Jim Corbett National Park, excited to see the national animal of our country, the tiger. Our eyes were glued to the forest on either side of the safari jeep at the national park. We were constantly hoping to catch a glimpse of the carnivore. Just when we had begun to absorb the vast greenery around us, we noticed a **crested serpent eagle** (*Spilornis cheela*) perched on the branch of a tall tree, as if watching over the entire forest. This mighty bird is a regular feature of the national park, and feeds on reptiles, amphibians, and small birds. As we went deeper into the forest, we heard a strange noise that resembled the bark of a dog. It was a **barking deer** (*Elephodus muntiacus*), also called red muntjac. This species is an omnivore, feeding on plants, bird eggs, and small warm-blooded animals. It makes a barking sound when it senses a predator.



Bombax

After a while, we saw a herd of **spotted deer** (*Axis axis*), also known as *chital*, nibbling at the grass, while a number of **grey langurs** (*Semnopithecus entellus*) hung from the trees at the very same place. These two animals share a special symbiotic relationship.

During the day, the grey langurs on the treetops pluck fruits for the deer and warn them when a predator approaches. At night, since the langurs have weak eyesight, they prefer to stay at ground level and with the deer then keeping the night's watch. It is marvellous to see how these two animals support and help each other in times of need, despite being so different. There is much to learn from their mutual relationship.

The lush green and dark brown surroundings were brightened by sunlight, when suddenly we noticed the pug mark of a

tiger on the muddy road. With renewed hope of spotting the magnificent carnivore, we began to look more keenly at the forest. But as our eyes scanned the spaces between the trees, we began to notice the trees themselves. We noticed plenty of **sal** (*Shorea robusta*), **sisso** (*Dalbergia sissoo*), and **khair** (*Cenegalia catechu*) trees. *Sal* is a large sub-deciduous tree that is almost evergreen. The *sal* tree resin is used as an indigenous medicine to cure diarrhea and dysentery. Interestingly, some



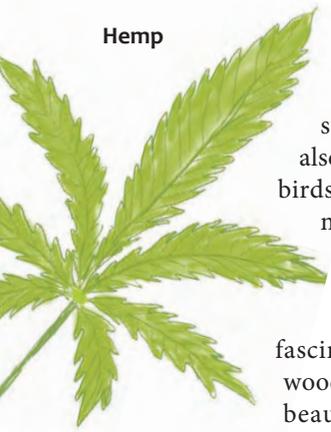
Crested serpent eagle. Photo credit: Ajay Pratap Singh

tribes send out marriage invitations in the form of folded *sal* leaves, along with a little bit of turmeric and raw rice.

To our pleasant surprise, rather than feeling dejected for not having seen the elusive tiger, we left Corbett feeling rejuvenated and excited for the next adventure. We were glad that our guide had opened our eyes to what we may have otherwise overlooked: the vast biodiversity that is the habitat of the tiger, without which it wouldn't survive. Being the super predator of the system, it is not only dependent on the rest of the ecology, but is also responsible for maintaining the stability of the fragile ecosystem.

Our next stop was a small hilltop village named Mensakhet situated in Almora district. The people we met there were very humble and accommodating of our queries. They shared with us their life experiences and their bond with nature. We learnt that their lives depend a great deal on the **oak** (*Quercus leucotrichophora*) trees that surround their hills. The oak tree





Hemp

has high water retention capacity and releases water into the soil at a very slow rate, thereby maintaining the surface and ground water levels. The tree also hosts a wide variety of insect-eating birds, tree frogs, spiders, and owls, thus maintaining a healthy ecosystem.

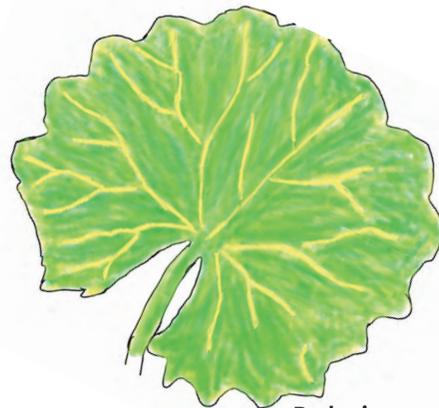
Rhododendron (*Rhododendron arboreum*) or *buransh* is another fascinating native tree. Apart from its wood that can be used for furniture, its beautiful scarlet, bell-shaped flowers, which bloom between January and March, are used in the preparation of juices and jams. These household recipes are now being commercially produced by the locals. *Buransh chutney* is also made to prevent illness caused by seasonal changes.

As we navigated our way back through the homes of Mensakhet, I felt a sharp sting on my hand. When I looked back to see what it was, I couldn't believe it was a plant! "*Bicchu ghas*," literally meaning 'scorpion grass,' also called **Himalayan giant nettle** (*Urtica dioica*), is a very common sight in this region. The oil glands in the stinging hairs of the leaves contain formic acid, which when in contact with skin cause irritation. I was advised to rub either crushed wild *palak* leaves or cannabis, which generally grow right next to the *bicchu ghas* plants. After using the homemade remedy, to my surprise, the pain and irritation miraculously vanished.

Our journey then took us to the village of Bachuabandh in Chamoli district. The women here spoke about the various traditional medicines they prepare from the plants and herbs

that grow in this locality. Bharati Bhisht, a young chirpy woman from the village, told us that crushed **brahmi** (*Bacopa monnieri*) plant leaves are applied on the forehead to cure headaches. The leaf of a *brahmi* plant resembles the cerebellum of the human brain. I wonder if it is just a coincidence or by natural design, that *brahmi* is considered to be one of the most powerful brain tonics, and it is traditionally used to boost memory and intelligence.

Our trip to Uttarakhand opened our eyes to the ecosystem services that forests and ecosystems provide, for us as well as our fellow beings – especially for the people living in and interacting with that particular ecology. We also became aware of the amazing diversity of nature that the hype over tigers blinded us to. Unless we understand the environment around us, we will not be able to fully embrace it and utilize it in an optimal way. We need to nurture an undying love for Mother Nature and develop a connect with the soil in order to understand our roots. ■



Brahmi

Hemp/bhang (*Cannabis indica*)

- Used to produce paper, textiles, food, medicine, and fuel
- Hemp paper will last hundreds of years without degrading and can be recycled many more times than tree-based paper
- Yarn made out of hemp was used as sails
- Hemp seeds are a nutritious source of protein and more economical to produce than soybean protein
- These seeds can be used to produce nontoxic diesel fuel, paint varnish, detergent, ink, and lubricating oil

Red silk cotton tree/Semal tree (*Bombax ceiba*)

- Also called the 'silent doctor'
- Used to treat asthma, skin problems, and anemia
- Also lightens scar marks due to boils, freckles, acne, and burns

Recipe for treatment of skin blemish and pigmentation:

- Take the thorny part from stem of semal tree. Make a paste from the root of the thorn with water. Apply it on affected areas.



Giant Eye

■ CHAITANYA PATIL

As a child, I would often stare blankly at the endless fabric of the night sky – pitch black and embroidered with stars of varying brightness – wondering what to look for. On my ninth birthday, I was gifted a giant encyclopaedia with detailed sky maps, but I could make little sense of them. In reality, the night sky looked different from the neat diagrams of the book. Lacking patience and maturity to study them in detail, I stared on listlessly.

The Ancient Greek astronomers had made similar maps, I had heard. I wondered if they too, at some point, felt intimidated by the sheer complexity of the clear winter night sky, just the way I did. I tried to put my encyclopaedia to better use. Every time my science teacher asked us to look up certain concepts as homework, I would rush to it and find out every bit of information on that topic.

Years passed by, and this habit matured into a sincere love of science. I grew very fond of Physics, thanks to Mahajan Sir, a retired IIT professor, and I saw astronomy as a mere extension of physics. His lectures would swing seamlessly between the two.

His love for both these subjects rubbed off on a few, and we'd spend many hours in his cabin, discussing the fascinating wonders of these subjects. Our sessions would go on late into the night, and end when we grew tired of readjusting the telescope again and again. We would go to bed with the promise that we'd be back, and that we would explore a few more of the infinite celestial objects that exist in the universe.

This June, we visited the Aryabhata Research Institute of Observational Sciences (ARIES), Nainital. The Observatory houses one of the oldest optical telescopes in the world. The reflecting telescope, 104 centimetres in diameter, was set up in 1972. Dr. Biman Medhi, a research scientist briefed us about the telescope.

The telescope consists of a paraboloid concave mirror that is kept in a large vacuum flask. The "eyepiece" of the telescope is an electronic device, a sensor which converts the incoming light into an electrical signal and sends this signal to a computer, which then displays the image. The sensor is kept at a very low temperature in order to reduce thermal noise. This is done with the help of

a cooling system which uses liquid nitrogen. The telescope uses the polar spherical coordinate system to locate celestial objects – direction to which the telescope is pointing is controlled by rotating it on two perpendicular axes with "Servo motors." The instrument is kept under a dome, which protects it from the elements of nature, and can be opened when the telescope is used. The dome also ensures that temperature inside the observatory is constant and the light coming into the telescope is in the form of an undistorted plane wavefront – distorted plane wavefront would result in unclear images.

I haven't met Mahajan sir in years, but keep writing to him every now and then. He will be thrilled to hear about my visit to the observatory. He's past eighty years now, but his enthusiasm does not seem to wane.

Most people seem to spend their lives without knowing the name of even one constellation. I wonder what it is about astronomy, then, that makes some people dedicate their entire lives to its study. Perhaps, in our modern world of unpredictability and rapid growth, they find respite in the unchanging night sky. ■

A deep look into space through one of India's largest telescopes



The 1.04 metre reflecting telescope at ARIES.

Photo credit: Phungreikhan Longvah



शिक्षा की परिभाषा

■ तरु

शिक्षा.....क्या आप इसका अर्थ समझते हैं? 22 वर्ष की मधुबनी पेशे से थी तो एक अध्यापिका, लेकिन जब भी वह इस शब्द का अर्थ खोजने निकलती तो कुछ उलझ सी जाती। उसका बचपन तो कुछ अंकों की भाग दौड़ में बीत सा गया था। माता-पिता ने कभी किताबों से उठकर देखने कहा दिया। "डॉक्टर ही तो बनेगी हमारी मधुबनी", मां कहती थीं। लेकिन मधुबनी भी तो दृढ़ विचारों वाली लड़की थी। उसने निश्चय कर लिया था कि कुछ साल पाठशाला में पढ़ाकर फिर खुद का स्कूल स्थापित करेगी। अपने गांव की पाठशाला में मधुबनी को तुरंत ही नौकरी मिल गई थी। और कुछ नहीं तो उसने यह तो तय कर लिया था कि उसके बच्चे समाज की रचाई "रेस" का हिस्सा नहीं बनेंगे, अंकों और डिग्रियों की खोज में अंधाधुंध नहीं दौड़ेंगे।

जवान व चंचल मधुबनी बचपन से ही गुस्सेल थी, लेकिन बच्चों की मासूमियत ने उसे शांत व धैर्यवान बना छोड़ा था। उसे यह बात पता चल गई थी कि बच्चों को समझाने और समझने के लिए प्रेम ही एकमात्र उपाय है। वह अध्यापक के नक्शेकदम पर चलते हैं। छोटी मीना की मां से पता चला कि वह तो घर लौटकर अपनी मैडम की पूरी नकल उतारती है। स्कूल-स्कूल खेलती है। मधुबनी जान गई थी कि उसका काम हीरे को तराशने या गीली माटी को सांचे में ढालने से कम नहीं था। उसको अपने हर अनुभव से एक नई सीख मिलती थी।

वह अपने बच्चों को गीली माटी की सोंधी खुशबू, लहराते फूल पत्तियों, सूरज की पहली किरण के साथ चहकते पंछियों का महत्व बताना चाहती थी, वही सब चीजें जो हम उम्र बढ़ने के साथ भुलाते जा रहे हैं। अब से उसकी हर कक्षा, स्कूल की चारदीवारी में सीमित नहीं थी। उसने अपना स्थान एक पास के बरगद के पेड़ के नीचे बना लिया था। उसके चारों ओर बैठे बच्चे अब फूलों और पत्तियों के माध्यम से रंग और आकार सीखने लगे थे। सारे बच्चे अब पंछियों को उनकी आवाजों से पहचाने लगे थे।

पांच दिन पेड़ की छाया में बैठने पर राहुल ने गंभीरता से मधुबनी से सवाल किया—"पेड़ तो मिट्टी से आते हैं, पर ये मिट्टी भी तो कहीं से आती ही होगी?", मधुबनी का चेहरा खिल उठा। उसके बच्चे अब सही दिशा में सोचने लगे थे। उस दिन मधुबनी ने बच्चों को स्कूल में बनाई जाने वाली खाद की प्रक्रिया समझाई। "क्या स्कूल की कैंटीन का सारा गीला कचरा खाद में बदल जाता है?" रोहिणी ने आश्चर्य से पूछा। गीले कचरे और सूखी मिट्टी के घोल को एक महीने ढंके गड्डे में मिलाते रहने से स्कूल खुद की खाद प्राप्त करने में सफल होता है। ये बच्चों के लिए और उनके माता-पिता के लिए एक बड़ी सीख साबित हुई। मधुबनी ने कई घरों को ये प्रक्रिया अपनाते हुए देखा। ऐसी छोटी बातें किंतु बड़ी सीखों से भरपूर इस शिक्षा ने मधुबनी का मनोबल मजबूत किया। उसका अपना नया स्कूल भी इसी नींव पर अंततः बन ही गया। ■



रेखाचित्र: मेन्सा पुरी गोस्वामी

Thanks to: Sharmila Sinha, Ranjita Menon, Rakesh Bains, Vikas Sharma.

For production: Kirpal Singh, Chaitanya Chandan, Surender Singh, Rakesh Shrivastava

Enviro-heroes

There are times in your life when you meet certain people who leave an indelible impression on you. Their passion is not only laudable, but also inspiring. On a hunt for answers, Richa Agarwal met these zealous crusaders who changed her outlook entirely. They are working as catalysts at the community level, engaging directly with the people and making a difference.



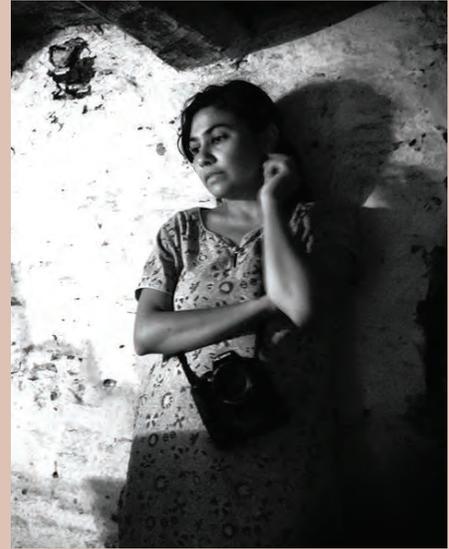
Bachi Singh Bisht

is an eccentric gentleman who has been an avid bird watcher for nearly two decades. His knowledge of birds is admirable, as is his keen interest in wildlife and forests, making environment the centre of his work. He was born and brought up on the periphery of the Jim Corbett National Park, Uttarakhand in the city of Ramnagar, but it wasn't until his early 20s that he involved himself with the forest. Since then, his burning passion for the forest and the life that surrounds it hasn't simmered down.

Now, he knows the forest better than most in the area. Unlike his rugged appearance, his demeanor is positive and humble. When asked about how he sees the future of the national park he softly replied, "It is beautiful. Let's just hope other people realize it too." Even the hostility of other safari guides who are put off by his sincerity doesn't seem to faze him. Against all hardships and criticism, he continues to do what he loves for the environment, and in his own peculiar way is changing the hearts of those who are willing to give him a chance. For anyone looking out for him on their next visit to Corbett, he could be the one wearing a t-shirt that reads: 'The early nerd catches the bird'!



Srishti Lakhera is a filmmaker by profession but an environmentalist at heart. She has previously worked with many non-governmental organizations, helping them to make films. One of these organizations, Sahapedia, documents traditional cultures and practices from various parts of India. She did a project for them in Uttarakhand, where she filmed women working in their kitchens. About one and a half years ago she visited her hometown, a small village in Uttarakhand, only to realise that almost all the people of the village had migrated to the cities. She then decided to make a documentary film on rural-urban migration to highlight its causes and effects on society and the local environment. In her early twenties, she spent a year at Auroville, Pondicherry, to study urban farming. She also engaged with traditional basket weavers in Kerala and learned their craft. To promote eco-tourism she undertook a solo bicycle trip from Kolkata to Chennai. Her inexhaustible energy and commitment towards the environment is praiseworthy.



Chayant Gonsalves of Bengaluru, Karnataka, has been a wildlife enthusiast and conservationist since a very young age. He recently graduated in zoology from Chennai and is going to pursue his masters in Wildlife Biology and Conservation. His experience belies his years, as he has already spent a number of years rescuing snakes from around his community. He strongly believes in co-existence with the wild. He has been sharing his know-how of rescuing snakes with his neighbours. While in college, he started an environment club that organised nature walks and awareness programmes within the campus. He has worked with organisations located in various cities on projects concerning wildlife. Among these are Agumbe Rainforest Research Station in Karnataka, Aaranyak in Guwahati, and Nature Conservation Foundation in Bangalore. He has travelled to Valparai, Tamil Nadu to study the patterns of birds and has also worked on a project in the forests of Arunachal Pradesh on tigers and other animals. He wishes to continue working in the field of conservation.

Bold yet simple, **Geeta Paliwal** from Almora district of Uttarakhand works with the Institute of Himalayan Environmental Research and Education (INHERE) to promote sustainable agriculture among the locals. She constantly tries to engage the youth in pragmatic agricultural practices and has also worked on projects related to climate change. She conducts awareness workshops for the villagers and helps women form self-help groups. For over 12 years, she has been travelling to the remotest villages in Uttarakhand for her five projects. Before that, she completed her graduation and post-graduation, while simultaneously balancing her work and raising her kids. For six years she has had to stay 200 km away from her village for a project. Her life story negates the notion that personal problems are bigger than that of the immediate surrounding. Geeta has stood against all odds for the benefit of the larger community.



The Green Alphabet

■ SAUMYA CHAUDHARI

A *sma Bibi, Chitra Didi, Esha Fufi, Guddu Halwai...* muttered Ravi as he hopped along his way to school, tugging at my hand with unexpected jerks and pulls. I struggled to keep him from falling as he bent left and right, touching trees lining our driveway and practising his alphabet in the unique manner devised by my grandmother to engage my father in his childhood. Today, his words tugged at my heart as much as his grip tugged on my hand. Reluctantly, I allowed my thoughts to return to the evening when both my elder brothers had expressed inability and unwillingness to maintain the ancestral bungalow in its present form. I had to admit that frequent repair was a drain on our earnings; in fact, more theirs than mine, because they were honest souls and believed that I had ‘sacrificed’ my career, first for our parents and later for maintaining our collective memories. “Memory Tax” we jokingly called it, but the fact was that after losing Ramesh in a scooter accident, I had found myself in a very vulnerable position with Ravi just beginning to crawl, and the peaceful, verdant setting of Dharamsala had beckoned me with hypnotic vigour.

“Hey Ritu! Good morning.” I heard Vikas call out and noticed his car rolling slowly beside me as I walked back home from Ravi’s school. I peeped into the window as he halted and found that he was already outside looking at me from over the top of his car. We burst out laughing.

“That was a fast ‘un,” I joked, reminded of the cowboy movies we had watched as kids.

“You could beat me at getting inside the car if you try hard enough,” and he disappeared in an instant. I followed, eager to put the morning depression behind me.

A few minutes later I was sipping coffee and admiring the view from his brand new hotel, while he sat across admonishing me for missing the inauguration. With Dharamsala becoming hot on the tourist list, his decision to enter the hotel business seemed opportune, but I felt discomfited by the thought of my haven turning into a construction-ravaged location. Alert as always, Vikas continued in my line of thought “A continuous stream of tourists nowadays...Business is good.”

“Yes, but don’t you think we are heading the Nainital, Missouri way?” I was pained by the thought.

“Well, I did include the basic ‘sustainable’ features, solar heating, heat sensors for bathroom lights and water faucets, LED lighting...what’s more, we even have a composting pit for kitchen waste. Those guys there are working on rain water

harvesting. There are government initiatives for these things you know?”

I felt and looked suitably impressed, but he surprised me by saying, “And you? What are you doing to help?”

“What do you mean? What can I do?” I wondered.

“Well, you are struggling to maintain a bungalow with more than a dozen rooms, when you need only two. How do you justify the wastage of constructed space, energy, water, and so on, even as new space has to be created for all these people coming in search of peace. You are not the only one. You know, so many people have just locked up their huge properties and are living abroad with their kids. No one talks about this. Private properties with ‘No Trespassing’ boards going to ruin, even as new areas get earmarked for ‘development’.”

“But...but I never thought of it like that.” The very idea of having strangers staying in what we considered our personal space seemed disagreeable and distasteful. It was easy for Vikas to say all this as his parents were government servants who had stayed on after retirement, but we had three generations under the ground. Those rooms were not empty, but full of their memories...I looked up and found him smiling even as his eyes threw a challenge at me.

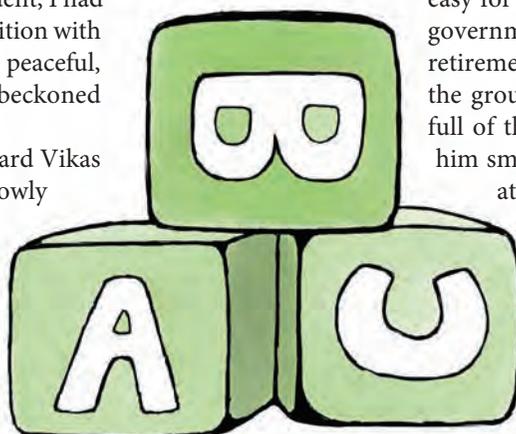
As I walked back home, having refused his offer of a ride, I was even more disturbed than I was when I had started out in the morning. Suddenly, the bungalow loomed before me and as always, the words, “Last night I dreamt of Manderley” sounded in my ears. Imagine putting rooms in

Manderley out on rent! I laughed to myself as another image emerged – that of Scarlett O’Hara clutching at a dry radish root in the fields of Tara...Yes, I could imagine rooms in Tara being let out. I could be Scarlett.

I spent a week mulling over pros and cons, and devoted hours to exploring various bed and breakfast models on the Internet. My mind was teeming with ideas when I finally put a call through to my eldest brother, Sameer. After five minutes I realised that the conversation was one sided and stopped with bated breath. Not known for wasting his words he said, “Hmm, I will see if Pavan is free this weekend. We’ll come over.”

I felt light headed. It was as if I had transferred all the weighty matters to their able shoulders, and only the finer ones were my concern. Ravi looked up from his drawing book and mirrored my smile, “Ma, let’s go count the trees.”

“No,” I said. “Let’s go to Vikas Uncle’s hotel for a coffee and you can practice your alphabet as we walk down.” ■



The young and the restless of India are growing up in a world of choices, ones that were not open to our parents. Since the 23 of us have been born into certain economic privileges, one wonders if this great power also brings with itself great responsibility (to borrow from Marvel's Spiderman). This one month has exposed us to myriad points of view. We've had an inside look into the workings of the government, urban planning bodies, and even the United Nations. We've had to step outside of our ivory towers to confront the reality of our waste and who cleans up after us, where our food comes from and who is bearing the burden of feeding us, and the truth behind our heavily subsidised comforts such as running water and electricity. It's quite a bit to take in over the course of a month. And now we ponder over what to do with all that we have gained. But we have also gained a community of conflicted fellows, not just 23 of us, but also the seasoned conflicted souls at CSE who have grappled with these questions for much longer. And in this we find much comfort. We are not alone. And off we go on our self-charted and yet collective journeys. — Rohini Deb



The month long with AfS, 2016, had twenty eight lectures, seven days of field visit, assignment discussion, hectic magazine making – drawing, writing, shouting, shouting back, eating bhujia with chowmein, late nights with Kirpalji at the production unit, mangoes and bananas for dinner, a quick impromptu singing and clicking wonky pictures.... You name it we have done it all. We had fun but we braved the summer heat to draw a plan to make one of the largest unauthorized colony of India a smart city. There were tonnes of learning and lots of fun.

LOOKING BACK...



I learnt how to strive for progress and not for perfection



Changed the way I look at things around me

Leaving with wider Perspectives, more aware Self, and treasured friendships



This programme gave me a new perspective to life



If I have a time machine, this is the time I will surely visit, again and again!



From complete shambles to a wiser thinker



If I were Newton, the programme would be my free falling Apple



Showed me the path of life



The chase for a solution!

My embryo of thoughts has grown into a person

Mind twisting, mind boggling



Thought provoking!

Tied up the loose strands of thoughts and questions in my mind



It was surprisingly informative!



Seeing the actual truth of the country has been a life changing experience



Beautiful, enriching journey with the best bunch in the world



Hell a lot of colossal month with the perfect squad!



A cauldron of knowledge and experience

Most reassuring to meet like-minded people



Intense and thought provoking Journey



Got me confused and angry regarding issues - far better than being indifferent!



Gained a lot of insights and learnt to ask the right questions



Truly an eye opening experience, took away our preconceived notions