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भारतीय अंतरिक्ष विज्ञान एवं प्रौद्योगिकी संस्थान की अर्धवार्षिक पत्रिका

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Indian Institute of Space Science and Technology

वलियमला, तिरुवनंतपुरम Valiamala, Thiruvananthapuram

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From the Editor's Desk

Friends,

This issue of Surabhi is coming late. Even if it's late it is fully loaded with reviews, essays, articles, paintings and travelogue. The transformations that are happening in and around us because of the pandemic are reflected in the content of the Surabhi also. We are surviving in a period where we unlearn certain old habits and learn certain new and good habits. We started using a new set of vocabulary and are more concerned about our health and hygiene. In spite of all these difficult times, we have familiarised the unfamiliar and are pursuing hard to move forward. We are all born fighters. We will adapt. We have to fulfil our dreams and aspirations. Surabhi wishes all its readers a happy, healthy and safe journey. Even if physically we maintain social distancing, let it be a time to think about our fellow beings who are struggling to survive.

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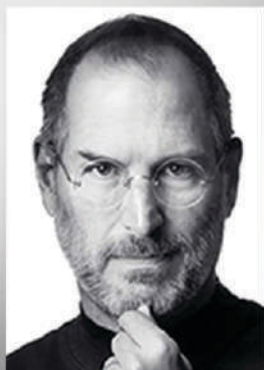
ORDER OF THOUGHTS



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When you love someone, you want to do more and more things for them, you want to keep them happy by saying words that will make them feel warm, and you will work hard to make the tiniest thing perfect for them. But what is it like when you hate someone? Everybody does hate someone or the other- business enemy, political leader, school teacher, your neighbour, etc. You don't want them to exist, you want to tease them or torture them. This is a natural response to hatred. But we don't do the above. Why? Roughly speaking, there are two answers: 1. We must respect law and order. If I do this, I will fall into a lot of trouble and eventually a punishment. 2. Even killing an ant is a bad deed. It has a bad feeling attached to it. Torturing some other human has an even worse feeling.

We can see there are two groups of people. One who relies on logic while the other on feelings. But no human is a strict follower of one group. Several times in life you are on a cross-road. One path seems safe and the other is risky but has an intuition to it. The other animals, while having a little logical

order of thinking, most of their decisions are based on what they feel is correct. They do what they like to do. But as humans, we have perhaps lost the freedom of doing what we like to do. We need to care about the coming generation, of the society and the like. Occasionally, taking a logical decision is crucial but it is tough to ignore the feeling related to it. You know that you will be the one suffering the most if you take this decision. But you will be safe, your family will have food to eat. While logic is a second-order thought, intuition or feeling are of the first order. Both may lead to the same conclusion or contradictory. (Some philosophers believe that humans have infinite order of thinking, but let's just stick to the first two.)

What I feel is, there is an age of following a particular route. College time is the most joyous time of one's life. You do not have to worry about earning, about society, not much is expected of you. This is the time you can 'test' such things. You can test what is better- to rely on logic or feelings. Your mistakes will be forgotten, won't affect many

people around you, this is the perfect time to come out and do what you like to. But there are people who rely on this feeling well beyond their college. These people either turn out to be a total failure or are bring about a revolution. Steve Jobs, Sachin Tendulkar, Elon Musk, NusratFateh Ali, and several others were just failures in their life at some point in time. They had an option to do something safe, imposed upon them by society, or do something risky, that they wanted to do. They relied on their intuition,

perhaps they could sense that their work was a piece of art that the whole world would appreciate one day. Life is a beautiful outcome of experiments going on in the laboratory of the brain. I think that one must keep testing things, keep playing with nature. Of course, being cautious at times is very important, taking logical decisions is important on several occasions. But relying on intuition or feeling can bring a revolution, far bigger than ever imagined.



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Once Upon a Time in a No Man's Land - The World of EHRA

"Shh ... be silent...take your water bottles and come!" We were woken up in the middle of the night by our guide. After a tiring day, a heavy dinner, and drinks, I am not sure how many of us could really understand what is happening around us. The year is 2010. The location is somewhere in the middle of nowhere, in the Namibian desert, in southern Africa. A herd of elephants have just walked into our base camp in search of water. For our guide Joe, who is also the founder of EHRA, this was not a surprise. The camp has a big water tank built up for these thirsty, desert roaming, African giants. When I decided to volunteer for EHRA I didn't have much idea about what to expect. I was looking for a place where I could do some volunteering and vacation together. Having been in Namibia a couple of years before, and having fallen in love with the continent ever since, it seemed like a logical decision for me to go on holidays there. And

a Google search led me to EHRA. Elephant Human Relationship Aid (EHRA) is a non-profit organisation based in Swakopmund in Namibia. EHRA tries to improve the relationship between the desert elephants and the villages on the boundaries of the Namib deserts in Damaraland in Namibia. As the humans and the animals fight for the same resources (in this case, water), it's obvious that they clash. Mostly with disastrous consequences for both parties –destruction of property in case of humans, and, being shot by the humans in case of elephants. EHRA tries to avoid this conflict, by securing water points by building walls around them, repairing the walls destroyed by the elephants, and monitoring the health and movement of the elephants in the deserts. Financially, they try to meet their ends in the form of donations or by offer for volunteering – the volunteer brings in the money and the manpower. A week of hard

physical labour in the hot desert climate, being drenched in sweat and dirt with the possibility of a shower only once in a week, sleeping on the ground in the company of flies, scorpions, baboons, hyenas and elephants, are not conditions one expects for an ideal holiday. Eating by the campfire with an international menu prepared by amateur cooks, living with a group of strangers from all walks of life, and tracking the wild elephants in an open 4WD augment this far-out experience. Needless to say, it will be no exaggeration to reminisce about moving around an inhospitable terrain in that 4WD! In fact, you hardly sit! But believe me, these are atypical escapades that one experiences only in Namibia, and gives the satisfaction, "I am glad I did it!" The overall volunteering package with EHRA is simple; one week of construction or "build week", and one week of desert elephant patrol or "patrol week". This requires no age restrictions and experience. Everyone does what they can. AND don't expect the comforts of your city life; there is no phone connection, internet, Facebook or Whatsapp. In fact, you will not know what is happening around the world for two weeks. In this age of social media, this may be a bit too much for some of us. But for me it was perfect! For me the highlight was an opportunity to live in the African bush, far away from the comforts of modern day, under the clear African skies, in close contact with the flora and fauna of the Namibian desert. I was excited!

The moment I landed in Namibia, I knew I did the right decision. I never understood what attracts me to this continent again and

again. Is it just Namibia, with its empty spaces and amazing landscape? Or is it the people and the simple life they follow. I don't know. The only thing I knew was that here I can relax, forget about the outside world and sleep like a baby. Priceless!



The build site and the protective wall

The EHRA meeting point is in Swakopmund, a coastal city with its old colonial German charms, in western Namibia, about 352 km from the capital Windhoek. After a day in Windhoek, I took the public transport to Swakop (nobody says the full name here), which is around 4.5 hours of travel from there. For first-time travellers to this part of the world, the landscape is a feast for the eyes. It is mostly semi-arid to desert climate over here, with temperatures ranging from 40-50 degree during noon to close to zero degree at night. In this outlandish place, one may seem to slumber into ennui, but magically, every second in the road out there, the arid landscape encompassing you keeps transforming its contours so briskly that you never want to take your eyes off from the scenery around you. The best part of it, at least for me, is that there are hardly any humans in Namibia (when compared to India). With a population of close to 2 million and a population density of 3.2/km², Namibia has the second-lowest population

density in the world after Mongolia. And, when you come from the hustle and bustle of a country with 1.2 billion population, this place is heaven.

I met with the project co-ordinators the next day. After an initial briefing, we headed for the first stop in the desert, the base camp. The base camp is situated on the banks of the Ugab river bed in Damaraland. The Ugab, though nominally a river, flows above the ground only for a few days in a year. The water is mostly subterranean and it sustains the wildlife population above it including the desert elephants. The camp is nestled in a no man's land, surrounded by hills of rock boulders. It gave us a good impression of what else to expect in this adventure in the coming days. Ours was an international mixture of nine individuals, from all walks of life, in the age group from 19 – 40 years old. Some were beginners like me, some in their second term, and some of them who came for two weeks ended up staying for 3 months! I guess every one of us was sick of the daily routine in one way or another and everybody more or less had the same intentions, to do something good and also to know more about the country, people and its culture.



Dinner at campfire

The base camp is where we start and end our project. But we hardly stay there. It's a camp where everyone sleeps under a large tree on the side of the Ugab river on a wooden platform. It's also the place where we come back after the build week to relax, clean up ourselves, before going for the patrol week. Cooking is done in a campfire, in an open-air kitchen, with volunteers taking turns for kitchen duty (preparing morning coffee, breakfast, lunch and dinner). By the way, there are no fences, so all kinds of wildlife are free to visit the camp. The best time in the camp is at night, with the stunning African skies in full glow. You literally sleep under the stars!

In the build week, the volunteers construct protective walls around water pumps, tanks and windmills, belonging to farmers and communities, in villages near the Namib desert. The walls are constructed in such a way that the desert elephants have access to the water without damaging the infrastructure. At the base camp, we stock up food, water, construction materials and tools required for the next week. EHRA works in coordination with the Ministry of Environment and Tourism (MET) and the site was decided based on their request. Our worksite is a land near to the border between the northern and southern Damaraland. And our task for the week is to repair a wall around a water tank destroyed by the elephants, and, to build a new wall around it. It's a place which will not show up in any Google maps, an inhospitable terrain where one wonders how life sustains in such harsh climes. But there he is, a farmer living with his family along with his cattle in a land

frequented by elephants. He was desperately looking for help from the government to repair the damage done by the elephants which will eventually threaten his livelihood. Indeed this is an ideal recipe for conflict between humans and elephants. Some, under such contingent circumstances, had resorted to violence before – shoot the elephants. But for EHRA, this is their working field, exactly the kind of situation that they have long tried to avoid. And this became our motto too for the next week.

We made a camp on a riverbed close to the construction site. Our constant companions were scorpions (inside the backpack, under the mattress, you name it! all of them venomous) and flies!! And hyenas at night (we just heard them, nobody saw them I guess). We woke up at sunrise every day. After a quick breakfast, we headed for the construction site. The construction work was hard physical labour. The work included digging for the foundation of the walls, rock and sand collection for the construction. The sand was collected from the riverbed nearby and huge rocks from the surrounding hills. We stopped before the temperature rose, relaxed, had lunch, and then started again around 3 pm when the temperature was manageable again. The farmer and his family were very kind. They also worked with us the whole week and even invited all of us for lunch on the day of his sons' birthday. They hardly had anything to eat; still, they killed one of their goats to prepare food for the group. After five days of hard work, we managed to finish the wall around the water pump almost completely.

It was a hard job and I could literally count all the muscles in my body which were previously unknown to me! But the heartfelt gratitude of the farmer and his family for the little work we did was more than enough for me to forget all those discomforts.



my first encounter with a desert elephant

On the weekend we returned to the base camp. It's the first time we had a shower in the whole week. At first, I felt discomfort with the accumulating dirt, sweat and the stinking body odour. But as days passed by none of us ever bothered about it. At the base camp, some of us climbed the nearby hill, played football on the riverbed, read books or listened to music. Joe, the founder of EHRA arrived at the camp on the weekend to take us for the patrol week. We got a small briefing about the risks involved and also how to conduct ourselves in the presence of elephants.

EHRA uses the patrol week to track the different desert-dwelling elephant herds in the rocky plains of northwest Kunene region, and build up databank on their health, distinct physical features and movements. They use the data to strategise the waterpoint protection work. Based on their movements, EHRA informs the villages

about the herds nearby or warn them of their visits. The patrol week was an incredible experience. We travelled in inhospitable terrains in a 4 WD, searching for the secretive elephants through regions blessed with amazing natural beauty. On each day at sunset we camped at places where we landed up, that is, different places on each day. The harshness of the terrain implies that it's a test of endurance for the 4WD and you hardly get a chance to sit properly in the truck, most of the time you are just bumping from one corner to the other. In addition, you get first-hand information about the biggest mammals on earth from Joe who has decades of experience on the field, and also someone who is deeply passionate about what he does.



a herd of desert elephants 'sand bathing'

The area where desert elephants roam around in Namibia is around 100,000 km² (that is, an area equivalent to Bihar state) mostly sandy desert, rocky mountains and arid gravel plains. There are probably 100-200 desert-dwelling elephants in this region. Under those conditions, you can say that tracking the desert elephants is a highly specialized art. And these guys are so good that they can look at a footprint/dung of an elephant in the sand and judge how old the

tracks are, the direction they have moved and how many hours/days to find them. By the way they can spot these tracks from a moving 4WD, which none of us could recognize as a track in the first place.

On the first day of the patrol, Joe managed to find elephant tracks which were less than a day old. After a few hours of driving, we stopped and moved on foot to a nearby hill to have a look around. Even with the binoculars I couldn't see anything. But Joe with the help of binoculars and his trained eyes managed to spot two adult bulls (male elephants) at a distance, probably close to a kilometre away. Joe was sure that they were moving in our direction and so we decided to wait there. We climbed a nearby boulder and waited. When I came to know that the elephants can climb boulders I was not comfortable about the place we selected for waiting. In addition, he made a comment that if they start climbing then run to the next boulder which is relatively taller than this one. Phew! That was very comforting!

After an hour or so, as predicted, the bulls started appearing. Out of nowhere, one more bull joined and they started fighting. It was a scary scene, especially when you are seeing these giants for the first time in the wild. After a while, they stopped fighting and moved away. But one of them caught the scent of us and decided to have a closer look at us. It stopped in front of the boulder, hardly 20 m between us. None of us moved, and I was at the front and I froze. Terrified and wondering whether I should run to the next boulder or not. Luckily the elephant lost interest in us and decided not to climb. That

was my first encounter with a desert elephant. Looking back, despite the fear, I think I enjoyed it.

Joe is partly eccentric, funny, half bushman and according to the locals “an elephant whisperer”. I don't know how much of it is true, but the elephants definitely had a different approach to him than others. Or in other words, he respects their space. He always approached them in the 4WD downwind so that the elephants can catch our scent from a distance. The last thing these giants want is to be surprised. I have seen a herd of desert elephants going rampant when one of them was surprised by a group of warthog and kiddos out of the bush. Then he parked the vehicle at a distance, the so-called 'comfort zone'. It's the comfort zone for the elephants (definitely not for the humans), so that they know our presence, but are least bothered, and they go on with their business. We never moved further towards them. Many times they got interested and came to us, sniffed around our trucks and walked by.

Some times in the presence of elephants Joe makes a strange sound with both his palms closed together. Once I asked him what that means. He said that he doesn't actually know what it does to the elephants. But the elephants always respond to it in such a way that they looked very relaxed. Remind you, these are not the tamed elephants that we are familiar in India. These are truly wild animals. That's one thing that always surprised me. From where I come from in India, the wild elephants mostly charge at humans when we are close to them. But

here, they were always relaxed, unconcerned by our presence. But they were never aggressive, or uncomfortable to our presence. But we were definitely terrified. Joe said that they do behave differently when they see people in government vehicles, or they come across local people. This is one of the reasons for his “elephant whisperer” nickname as the local people and the government officials are perplexed why the elephants respond differently to him. I guess it has a lot to do with the amazing memory these animals have, which we often read in articles and reports. The elephants that we came across do seem to recognise either Joe or the vehicles from EHRA. Joe talked about instances where when the relationship between the herds and the villagers got worse, the herds hang around the EHRA base camp. Maybe because they know it is a safe place. Joe believes hundred percent in what he does and that shows in the results of EHRA work so far. In the last seventeen years, EHRA has completed around two hundred walls at different sites in the southern Damaraland with the help of volunteers. This is in addition to the other projects like school renovation, training courses for the rangers, elephant awareness program among villagers, etc.



searching for the elusive African giants

One day during patrolling we stopped at the top of the mountain ranges to look for signs of elephant movement. We didn't see any elephants the whole day, though we saw many tracks all along. Surprisingly, all of them were one or two days old. From the place where we stood, for all of us it was a 360-degree possibility to search for the tracks. Somehow Joe decided to move in one particular direction on foot and about 100 m ahead we saw new footprints of the elephant. Tracks which were not more than 5 hours old! When asked later about the reason for moving in that particular direction Joe said it's just a feeling. All other directions didn't feel right! Yes, there are no scientific explanations for such instances. But in the book "Elephantoms" by Lyl Watson, he cites experiences from elephant trackers who "feel" the presence of elephants, though there are no indications of them in the form of sound or physical presence. He talks about the vibrations and the infrared frequencies which the elephants use to communicate with other herds hundreds of km away. Can humans feel such vibrations? Scientifically speaking, no! Then what about the "feeling" that these people talk about? I don't know, but I could see that something is different with them.

The more I learned about these amazing mammals, the more I fell in love with them. I come from a place where I am acquainted, right from my childhood, with tamed elephants at nearby temples. But there in the arid Namibian desert, I realized that I know nothing about these beautiful giants. After that one week of patrolling, I ended up having a lot of respect for these giants that

ruled the Namibian deserts. It's not just the size, but their social structure, the behaviour and their fight for survival against all odds that impressed me. They are generally called desert elephants though desert-adapted elephants would be a more accurate description. This is because of their amazing memory to find the water points and food at different seasons, with the information, probably passed on through generations. It's a matriarchal society with the matriarch having absolute control over every decision of the herd from the size, movement, maintaining the discipline of the young members and throwing out the rogue ones, and helping the younger cows in the growth of their calves. The elephants have a life span of about 60 – 70 years and they die when the teeth grow old and fail to chew the food efficiently for them to survive. They have an amazing capability to move silently and also to stay still and blend with the surroundings to avoid detection. They can move at a speed of approximately 15 km/hr and also can walk more than 100 km continuously in search of food and water. It is believed that they communicate with each other within the herd using infrasound. I was clueless and perplexed at how they communicated with each other. All of a sudden they will start moving or stop moving without even looking at each other for commands. Joe said you can see the movement of the tip the trunk and bending of one of the toes when they communicate with each other, for example between the cow and a calf. The more I learned about these amazing animals the more I was fascinated by them.

After spending two weeks with the EHRA team it was time to say goodbye. No words can convey the freedom or the peace of mind that I experienced while sleeping under the incredible African skies. Nor can I explain the satisfaction I felt when the farmer and the family thanked us for the small work we did. For two weeks, the outside world and its complicated problems were alien to me, in fact, I never thought about it. Nothing in life seemed to be important, no physical or

material wishes, no expectations or disappointments and I was living a life which was simple, peaceful and rewarding. It was like resetting one's life to the basics. That being said, it takes a lot of courage to move away from the comforts of life one has, and follow the hard way of searching for a life that motivates you to live a life that is worth living. Hope we all will have that courage one day!

NAMIBIA'S DESERT-DWELLING ELEPHANTS

- * Both male and female African elephants have tusks
- * They can survive without drinking water for several days. If they are unable to find water, they survive by eating moisture-laden vegetation that grows in riverbeds.
- * They may walk up to 70km at night to find water points.
- * These elephants typically live in smaller herds to reduce pressure on food resources.
- * The African elephant's ear is 3 times larger than the Asian elephant's ear. Flapping its ears helps cool the animal down by cooling the blood flowing through the veins on the back of its ears.



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THE MYSTERY OF INTUITION

“When you reach the end of what you should know, you will be at the beginning of what you should sense.”
— Kahlil Gibrán, *Sand and Foam*

My childhood was in Nilambur a rustic village blessed with nature's bounty. During school holidays I used to stroll with my friends to nearby streams with fishing rods. We used to store earthworms to be used as fish bait. Despite all our preparedness; foreseeing the danger the fishes in the stream fool us by taking an escape route. Eventually, in the evening were turned home empty-handed. To our surprise, one tall guy, who used to appear with his black hunting dog astonished us with his outstanding skills in fish angling. He had such expertise in locating a place in water bodies teeming with fish. With great admiration, we used to ask him how he could find the place of teeming fish. Asked about this, he told the secret in a husky voice “Intuition shows me that”. He described it as a mysterious extra sensual and subconscious cognition.

Believing this we deemed him as a superhero. I too longed to possess this mysterious ability from him. I tried to please him by giving pleasantries to his hunting dog and assisting him in angling. But he never disclosed the secrets of his mystic power.

Time flies too fast. After completing schooling our boys' team dispersed for higher studies and gradually my craze for angling faded out. But still, I was always curious about the abilities of people who can foresee things. Once I discussed this topic with my dad; he thoughtfully smiled and gave me some books from his collection. The books were about scientific explanations regarding extrasensory perception. The well-researched articles in the books transformed my thoughts and enabled me to see the phenomenon from a different

perspective. What I perceived from the reading materials was that Intuition means a generalisation in the consciousness of a number of petty facts which are difficult to perceive and take into account. Such generalisations are possible only on the basis of extensive experience in the field. Though this awareness is not always synthesised consciously, such knowledge is the mother of Intuition.

An experienced farmer will have the ability to predict the future crop by a number of barely noticeable signs and an experienced old physician will immediately arrive at the correct diagnosis; similarly the abovementioned guy usually found the best fishing place. However the intuition cannot take the place of precise cognition based on a conscious analysis of specially obtained facts.

There are several stories about people who have mystic power to foresee things. But those cases do not vouch for the authenticity of the phenomenon. There are two ways of looking at Intuition. The mystic tends to consider it a paranormal or divine attribution, the pragmatist sees it as an unconscious drawing upon basic instincts, previous experience, and available clues to arrive at a probable decision. People profoundly talented show exceptional capacities to know realities and nuances

about different substances, individuals and conditions. These abilities may show up practically powerful to the uncritical spectator. Intuition may be defined as understanding or knowing without conscious recourse to thought, observation or reason.

Basically we take action based on facts, perceptions, inclinations, narratives or prejudices. Intuition is a learned skill acquired from experiences in life. It is actually a result of statistical analysis happening in our brain. Our mind learns to anticipate certain things based on real-world experiences. On the one side, we see the phenomenon from a sceptic point of view; if we make an effort to work backwards to search out the chain of reasoning that leads to the Intuition, certainly we'll get valid cues.

The human mind is never without thoughts; thousands of fleeting thoughts pass through our mind each day. Some people believe Intuition as the message from the soul and a few perceive it could be a divine intervention to point out a path in troublesome times. However, Intuition is a blend of facts and feelings and if we have the skill to discern between the two and with a realistic perception of the world, life would go on in a balanced manner. In any case, one thing is beyond any doubt, Intuition helped us to deal with life better on some occasions.



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Community Kitchen



The life had been standstill for the family of Manesh and Meera the last week. Even the kids had felt so. It was quite understandable that it was the fifteenth day of lockdown.

The first few days of lockdown had been spent joyfully when everybody felt it cool to take rest all the time. They had been on the couch either watching Tiktok or a movie on the TV, with the occasional crunching-munching offered by the snack boxes brought from the nearby shop. All had been eager to gulp down the statistics of COVID all over the world also, with the positive, heuristic mind, but with an attitude of 'It won't happen to me'. There had been euphoria in the parents that they no longer needed to make the kids ready for school. In fact, even before the lockdown, the kids' schools had been closed. They had been happy about spending the day at home, without taking leaves in their offices. There

had been an excitement in the kids about being with and knowing their parents closer than ever in their life.

All such exciting things took a sudden turn of boredom, a week later. They slowly started losing the consciousness of each day and every day appeared the same as any other day. They had to pinch and tell each other that one Sunday had already passed, without their notice. Everybody's initial excitement at the thought of spending time leisurely got lost, bit by bit in the tiresome monotony and the painful regularity of the daily chores. Even the happiness they derived out of the movies, Facebook and Tiktok were lost in a few days. So Manesh came up with an idea. That evening they would make Porotta, the so-called 'national' food of Keralites.

Nobody knew the recipe. So as usual for anything nowadays, they looked up the

Youtube videos. They had watched in hotels and shack-shops, with awe, at the skill displayed by the cook making the dough, throwing the dough balls in the air converting them to razor-thin circular sheets, all with the deft flick of their hands, in quick fashion. Meera told him that it was difficult to emulate them, as it would only lead to chaos in the kitchen, with the prospect of dough reaching every nook and corner of the room. She threatened the father and kids that she would not do the cleanup at the end of the process. Crestfallen, they were even ready to drop the idea. At last, Manesh found a recipe which was so much vocal that they needed no acrobatic skill to make the dish.

The father went to the nearby shop and bought 5 kg of the Maida powder and started the preparation. As narrated in the video, he took half kilogram equivalent of the powder and began mixing it with milk, egg, sugar, ghee, baking soda and whatever mentioned by the presenter. At first look, it looked so easy for Manesh and he joyfully shared the pictures of the preparation of the dough, along with his kids, over Whatsapp and Facebook. The family felt so proud of the instant likes and comments. Towards the end of kneading, Meera felt that the dough was a little dry compared to what was seen on the mobile screen. The husband and wife had a discussion and they decided to add a little water to it.

Manesh started mixing again with the added water. After some time, they felt that the dough was really wet and sticky. So they added a little more of powder and did the

kneading. The mix appeared to be in the right proportion. Then kid no.2, who was good in maths, asked an important question, "Papa, you had added two eggs to half a kilo of the Maida. Now you have added a quarter kilogram of powder. So the other things also are to be added in the same proportion, right? Then only Porotta will be tasty?"

The question seemed to strike at the very foundation of the culinary logic of the family. So Meera added a little more milk, sugar and ghee. And the poor father, who had almost stopped the mixing, started it again. Due to the addition of more milk, the consistency of the mix was lost and it became watery again. Everybody in the family looked at each other, asking what to do now. The kid no.1 reminded them, "Mom, you forgot to add baking soda, the second time. Everything else was added". He was only waiting for his dad to complete the second round of mixing.

Meera came with a bigger vessel and asked Manesh to transfer the dough. This time, everybody was careful about the inclusion of all the ingredients. The quantity of the dough had become bigger that Manesh had to use both his hands to knead it. He had started sweating so profusely that he had to take a few minutes of rest in between. Finally, when he was almost through, they found that the dough was hard as a nut. Manesh wiped his sweat, careful enough to be away from the vessel (unlike a professional Porotta maker, who does not mind his own sweat in the dough)

The cycle of doing, redoing of the dough continued for some more time.

The operations which started at 3 o'clock in the evening were over by 5 o'clock, when they got a consistent mix of the dough, as depicted in the video. Meera looked at the packet of Maida powder and heaved a sigh of relief and told them, " I think about a kilogram is remaining, luckily, for tomorrow's drama".

At six o'clock, the next round of operations started. They had to make small balls, spread them on the kitchen slab with a wooden rolling pin, cut them with a knife in the form of a skirt-string. Then they had to arrange the strings into a circular pattern and press them with their palm to make them into the round shape of the Porotta. Then it had to be heated on a pan, both sides. Once they finished five of them, they took all

of them and beat them from the sides, top and bottom, so that the Porottas looked fluffy.

The number was huge, seventy. In between, kid No.2 was sent to the nearby five houses to alert them about the Porotta being prepared. As and when ten Porottas were ready, they were taken to respective houses by the kids in turn. The last twenty were meant for them. Finally, at 9 o'clock, the last Porotta was taken off from the stove. Meera vowed that she would never ever make Porotta. Manesh fell down on the floor, exasperated, but with the satisfaction that he had become a part of the community kitchen scheme floated by the chief minister of the state, even without his knowledge.





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Crazy pawn pushing daughter



Most people for whom the game of chess is a passion are invariably considered 'crazy' by those who do not play the game. This is because only 'crazy' guys would happily be willing to spend several hours playing the game of chess and trying their best to squeeze just the slightest advantage against their opponents. The 'crazy' chess player is not going to be happy if he/she plays and wins easily without a contest and without 'much sweat'. On the other hand, the 'crazy' chess player may not be keen to play with the 'Grandmasters' and lose to them meekly. Suffice it to say that my eldest daughter is one of the above 'crazy pawn pushing chess players'.

It is difficult for me to exactly pinpoint the day when my eldest daughter became a 'crazy chess player'. Like most children who

get exposed to the game of chess when they are young, my eldest daughter started learning the rudiments of playing the game of chess at home when she was 'twelve'. While at first there were not many others at home to give her company with a game of chess, she quickly started dispensing most of her entire summer vacation period towards learning the intricacies of the game and honing her skills.

What started off as a pastime (her engagement with the game of chess), quickly became an ordeal for all of us in the family, as my eldest daughter was not finding anyone at home who had the time and talent to play a game of chess with her. She herself was extremely reluctant to cross swords with her younger sister and her mother, as she beat both of them effortlessly. Hence the

entire responsibility of giving her gainful company and indulging her in her pursuit of chess fell on me. To be honest, I am aware of my own mediocrity as a chess player with absolutely no illusions of my own inborn brilliant talent for playing the game of chess.

When I first noticed my elder daughter's zest for playing the game of chess, I started fancying her participating in school level tournaments followed by tournaments at the junior and the senior levels at college that would fetch her awards and laurels. Seeing her interest, I did manage to convince her to join a small chess club adjacent to our home. However, she did not get to play regularly with star chess players who were very accomplished; although there were a few well-established chess players with whom she played and invariably lost in the club.

I hoped that her passion for playing chess will slowly fade away with time; however, her zest for playing chess not only intensified but this also impacted her academics. Also, the only person with whom she wanted to play the game of chess was me, her father. Whenever I returned home from the office, I would be greeted by the eldest daughter waiting for me with the chess pieces neatly drawn up on the chessboard for a game. Although initially, I was game to the idea of engaging my daughter in a chess duel, the sheer exhaustion that I felt after a long day at the office, not to mention the number of hours that I have to spend sitting before the chessboard was enough to reduce considerably my ardour for playing chess.

The two essential rules of the game that both of us adhered to scrupulously was (i) neither of us will play badly and lose out to the other tamely, and (ii) a minimum of two games of chess will have to be played in order to neutralize any advantage of any one of us playing white. It goes without saying that each of us will play one of the two games with white pieces. If I win the first game after a hard fight and give up easily in the second game, I will be forgiven only if she is in one of her cheerful moods; else she would argue that I have given up easily in the second game which then would have to be replayed. The best situation to look forward would be one in which she would win the first game after a hard fight and graciously agree to call it quits if she is in one of her happy moods. This does not necessarily mean that I can allow myself to be vanquished in the first game itself without showing some semblance of a good fight.

To cut a long story short, my eldest daughter is no longer at school; she completed her college and had taken up a job. Furthermore, she is also happily married and had moved to another location in the same city. I do know that her husband does not share her passion for playing the game of chess. After my elder daughter's marriage, I started missing her; to be very honest, in fact, more than missing her, I started missing the long hours of chess duels that we both used to partake of every day. I used to worry a lot about her present likely companion in the game of chess, post her marriage and whether she is happy with the level and quality of the chess games that she gets to play.

One day, I decided to suddenly drop in and visit my daughter's house straight from my office. I hadn't informed my other family members of my decision. It was getting darker as I approached her house. When I knocked at her house door, I could not discern any light in the main dining room. She was genuinely pleased on seeing me at her house as it was a surprise visit. After politely enquiring about her mother and her younger sister, she ushered me to a room at the rear portion of the house. I was astounded to see on the table all the chess pieces neatly lined up on the chessboard for a game of chess; just as it used to be at our home before her marriage.

I realized my daughter hasn't changed one bit. I sank on the sofa to initiate the first of the two games of chess that would eventually follow. My thoughts were interrupted by my daughter's voice,

Papa, do you know the reason why I love playing chess only with you. I admire your fighting qualities and your tenacity and perseverance to win the chess game at all costs. Even though it is only a game of chess, I like your 'never say die' spirit which I am trying to imbibe in my life, in my office work and also in my chess game as well.

On seeing the chessboard all lined up with chess pieces; I had initially planned to lose easily the first game, hoping that she will be in one of her happy moods, which is the right thing to expect considering that she is recently married. I had fervently hoped that with her being in a happy mood, there won't be a need for me to play the second game of chess. However, after hearing her, I decided to live up to her image and decided to call home and inform my wife that I shall be late returning home.





Tushar Rathore

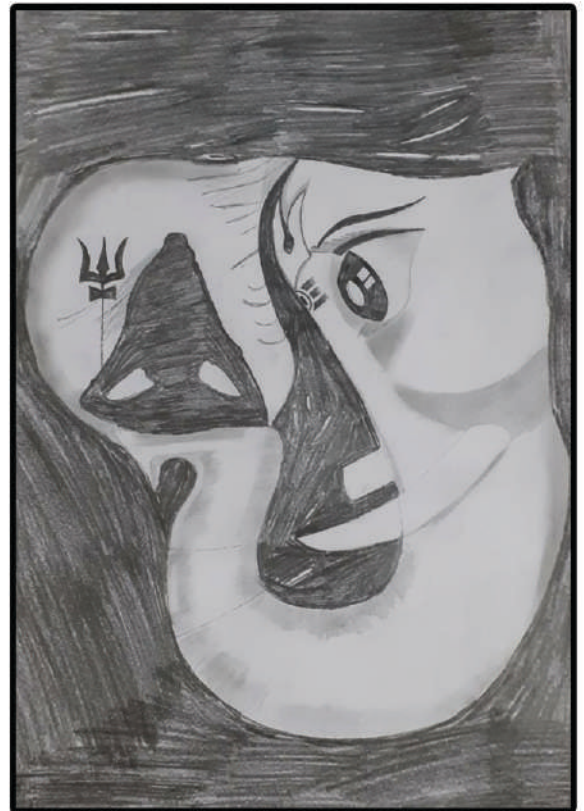
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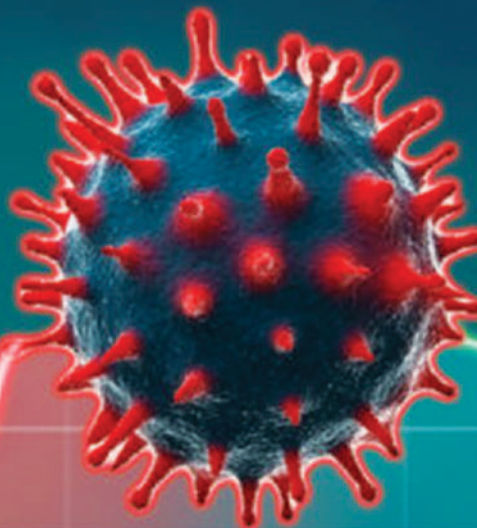


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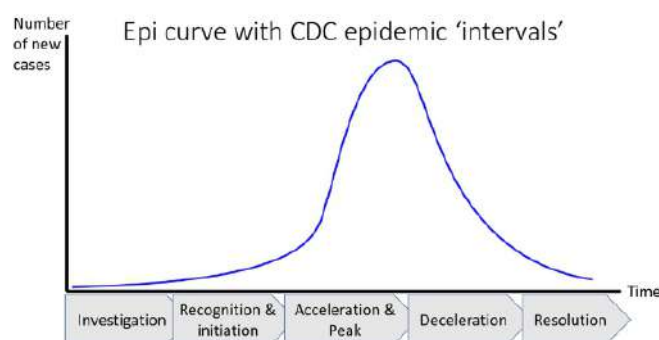
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Impacts of Covid-19 in the Economy of Kerala

Kerala state is claimed as a model not only to the nation but also to the world inefficiently controlling the pandemic with concerted and timely use of social distancing policy. These measures could efficiently flatten the infection curve in Kerala, but inevitably steepens the macroeconomic recession curve of the economy as well as the finances of the government. The closure of factories and schools, tourism spots, micro-medium industries and the cancellation of product exhibits and work conferences are a negative shock to the supply, and the impact of this shock can be transmitted via supply chains to downstream sectors in the state. Introduction of social distancing policy in a very high densely populated state like Kerala itself is a big challenge. About 50% of Kerala's working population is depending on the community, social and personal services. It is also interesting to note that about 40% of total employed people of Kerala are in the unorganized sector. Social interactions are very much imminent for a state which is having a very high density of population and are depending on more economic activities are orienting towards social interactions.

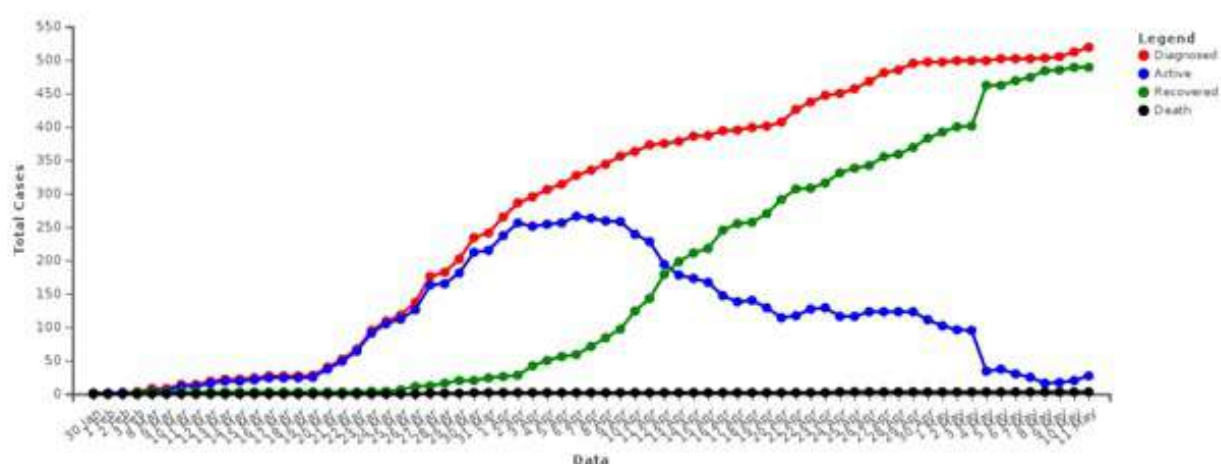
Fig. 1: Intervals, or phases, in an archetypical epidemiological curve



Source: CDC.gov, www.cdc.gov/flu/pandemic-resources/national-strategy/intervals-framework-508.html

Controlling the epidemic means 'flattening the epidemiologic curve'. This can be done by the ways of practising 'social distancing' and 'quarantining'. Social distancing can operate by reducing person-to-person contact overall via work and school closures, travel bans, social and religious gatherings, etc. Quarantining is the method of identifying and isolating the infected and potentially infected people through testing. Kerala introduced both the methods judiciously to flatten the epidemiological curve. The first case of novel coronavirus (COVID-19) in India was confirmed in Thrissur, on 30 January 2020. On 23rd March, the chief minister has announced a state-wide lockdown in Kerala, well before the announcement at the national level. COVID-19 epidemiological graph of Kerala has got peaked during the last week of March and the first week of April 2020 with maximum cases reporting a day up to 39.

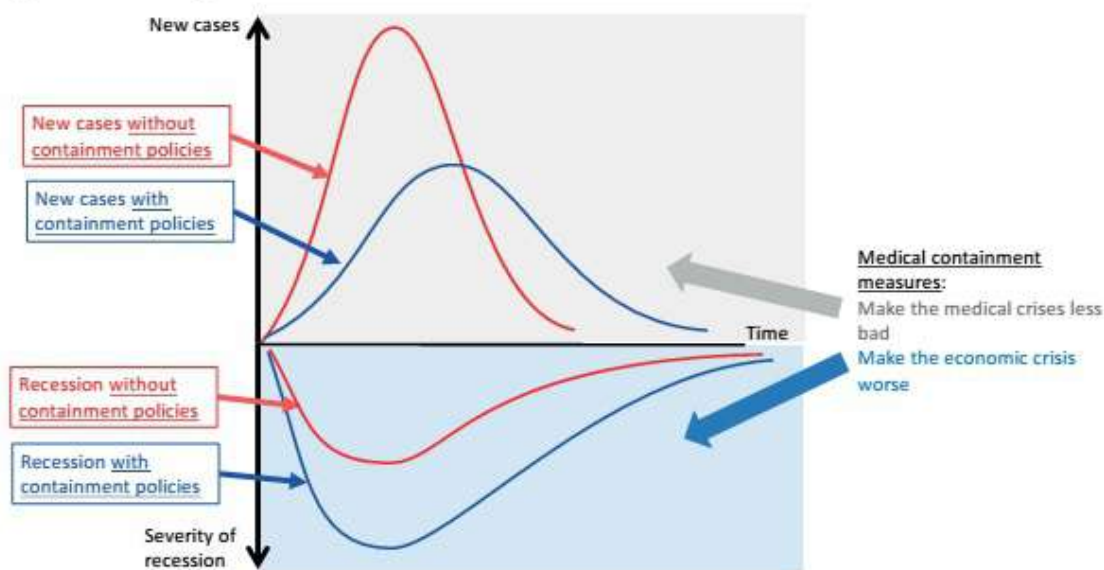
Fig. 2: COVID-19 daily graph by total number of cases, recoveries and death (Kerala 30th January to 11th May 2020)



Flattening the epidemic curve and effect of the recession

As Pierre-Olivier Gourinchas puts it: “flattening the infection curve inevitably steepens the macroeconomic recession curve.” The statement is largely true to the case of Kerala Economy. The focus of flattening the infection curve will exert a strong negative impact on the overall economy in the short turn, and potentially a large negative impact in some sectors even in the medium and long run. Controlling the epidemic means 'flattening the epidemiologic curve'. This is done by slowing the rate of infection by, for example, reducing person-to-person contact overall via work and school closures, and travel bans ('social distancing'). The social distancing policies are purposefully inducing an economic slowdown. A pandemic like COVID-19 would have a sharp impact on economic output for obvious reasons. Keeping workers away from work and consumers away from consumption both reduce economic activity.

Fig. 3: Flattening the Covid-19 curve and economic recession



Ref: Baldwin and Weder di Mauro 2020

Fig. 3 has divided into two parts with epidemiological curves in the upper part of the diagram and economic recession curves in the lower part. The red epidemiological curve shows the illustration of the reporting of COVID-19 without any containment policies and the blue curve is the illustration of COVID-19 spread with strict containment policies. It clearly shows that the introduction of containment policies, the peaking of COVID-19 with newer cases can be curtailed. Accordingly, this has saved the lives of many people in Kerala. The 'trade-off' for such an action from the government is the severe recession of the economy as shown through the blue curve in the lower part of Fig 3. In short, the economic recessionary effect of subsiding the epidemic by using strict medical containment policies like social distancing are much more severe than without any containment policies. The cost of inevitable strict containment policies (No alternative for that) of the government is the severe recession of the economy. The recession is a medical necessity. But governments can and should try to flatten the economic recession curve. By the introduction of early lockdown and its strict enforcement has severely ruptured the social and economic activities of the state.

The following are the potential economic impacts of COVID-19 in Kerala

- I. Specific impacts due to the introduction of lockdown and social distancing
- II. General impacts due to the spread of COVID-19 everywhere

Specific Impacts

Kerala state accounts for about 2.8% of India's population, and its economy contributes nearly 4% to the Indian economy. Kerala is one of the richest states in India with the majority of households in the affluent category, top human development rankings and high spending

powers despite being poorly financed government and low-level industrialization. However, economic activities are currently nearly paralysed over the virus scare in the state. Tourism and remittances sectors, which together contribute 10% of state GDP, have completely stopped and have led to thousands of people jobless. Kerala state planning board has estimated the losses in tourism March to September 2020 as Rs. 20,000 crore. The sectors that usually contribute fast growth in Kerala's GSDP like fishing and aquaculture, construction, manufacturing, trade, hotels and restaurants, social services mainly education and health, public services and professional services etc. are almost standstill and affected millions of people directly and indirectly. The expected loss of trade, hotel and restaurants during the months of March, April and May 2020 is estimated at 17,000 crores by KSPB. Total loss in agriculture during the months of March and April is estimated at 1570 crore. Many have lost their livelihood due to the introduction of lockdown. The planning board report also says that, on each day during the period of lockdown, the total loss of wages of earnings by the self-employed and casual workers in Kerala amounts to Rs 350 crore. Alcohol, which forms a significant part of the state government's revenue, was also banned during the lockdown period. Petrol and diesel consumption of the state during the lockdown has gone down to one-sixth of the normal level. State government mobilises monthly about 2000 crores as VAT revenue from petroleum products and liquor sale. During lockdown months, revenue from the same sources has come down to 400 crores and this has led to a severe financial crisis for the State government to the extent of the withdrawal of one month salary (in six instalments) of state government employees.

General Impacts

Kerala gets about a fifth of all NRI remittances to India. According to the estimates of Kerala State Planning Board, a loss of about Rs 80,000 crore in gross value added (GVA) to the Kerala economy in Q1 (Apr-Jun) of 2020. For March, the shortfall in GVA could have been roughly Rs 29,000 crore. The direct and indirect losses in gross state value addition (GSVA), based on an input-output model, is estimated to be 10% in 2019-20 and 20% in 2020-21. Kerala receives close to Rs 85,000 crore annually as foreign remittances, according to S. IrudayaRajan, a member of the state government's expert committee on COVID-19. Reports say Kerala could lose nearly Rs 13,000 crore in annual foreign remittances with more than 4 lakh Keralites who live abroad planning to return home in the wake of the COVID-19 pandemic. Among them are nearly 61,000 people who are already reported jobless due to the after-effects of COVID-19. There are nearly 2.5 million people from Kerala working in West Asia, Europe and the US. Around 90 per cent of these people work in West Asia, which is facing an oil crisis too, with most of them employed as skilled or unskilled labourers in the UAE and Saudi Arabia. Almost all economic activities of the state were fuelled by the remittances from abroad and the post-COVID-19 Kerala economy will feel a severe pressure of demand crunch, production loss and distribution disruptions. This will, in turn, worsens the financial situation of the state government in the form of drastic the decline in revenue and demand for more infrastructural support.

Another dimension of the crisis is the large scale flow of migrant labourers from Kerala to their mother states. Almost all economic and social activities of the state are totally dependent on the services of migrant labourers. According to the state government's Post Disaster Needs Assessment 2018, there are 34.85 lakh migrants in Kerala. Many of them also have returned to their hometowns in Odisha, Bihar, West Bengal, etc. due to COVID-19 related crisis. The outflow of migrant workers from the state will affect the production and distribution of various products and services. This can lead to severe ruptures in the supply chain of the economy. The Kerala government can re-engineer the labour system such that those who have been pink-slipped abroad may be able to find jobs in Kerala itself. The situation also throws up a new opportunity for the state government to re-engineer its labour system suits to the new normal situation of COVID-19.

Kerala has the eleventh largest economy in India and the service industry dominates the Kerala economy. Since the productive sectors of the state like agriculture and industrial sectors are not performing well, Kerala's services industries largely depend on the international market for its survival. The activities of the services sector have almost stopped because of the widespread of COVID-19. The immediate solution for the economic crisis of the state due to coronavirus is to help the people who lost their jobs with a minimum income for meeting their day to day expenditure. The important practice of 'social distancing' for preventing COVID-19 will become successful only when all sections of the population gets minimum income to meet their daily needs. Even if complete lockdown is there, people may get out of their homes for earning income to meet their daily needs. Several policies have been announced by the government for helping the people in the time of crisis. But the major problem of the government is its poor financial health. As we are aware, most of the activities related to controlling the pandemic have to be administered by the government and a large amount of financial resources are necessary for implementing those. The critical infrastructure like massive testing facilities, critical care facilities, providing emergency services, ventilators, food for the people who got quarantined and isolated, ensure the proper delivery of supplies to people, etc. required time and money. Every citizen of the state is a soldier to fight against the war of novel coronavirus.

Macro-level planning and local level implementation with micromanagement is the key for this new Kerala Model against COVID-19. Involvement of all kinds of stakeholders including the common citizens is the key for the success of this approach. In the new Kerala model, State government uses crowd information, crowd labour, latest technologies like data analytics, drones, artificial intelligence, telemedicine, NGO's, voluntary organizations, local self-government, Self Help Groups, video conferencing modes, most modern medical technologies, pooling of different expertise and experiences, etc. to form effective policies for controlling the spread of novel coronavirus. Continuous vigilance in introducing various relaxation measures is necessary for systematically taking out the economy from the severe ripple effect of COVID-19 pandemic.



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LOCKDOWN MEMORIES...

After the one day Janta curfew, when the first lockdown was announced for 21 days, I was really scared, how I am going to spend so much time at home doing nothing. Now, after the two lockdowns successfully completed and we are back to the office, the memories of lockdown haunt me and sometimes leave a pleasant reminiscence.

As we all know lockdown had a number of positive aspects too, like the sparkling water flowing in the most polluted Yamuna River, substantial improvement in air quality of metropolitan cities, the drastic reduction in the number of road accidents, significant fall in consumption of fossil fuels and most importantly, it brought out the hidden talents among most of us.

During the lockdown my job in the morning was to buy fresh vegetables from nearby shops, wash them neatly and chop in artistic shapes. I generally cut the beans vertically to make it appear like chilly and didn't dice the carrots round either. I brought vegetables like Ridge gourd, ladies finger, sweet pumpkin, Broccoli, cabbage, cauliflower, etc and told my wife the dish to

be prepared for the day in advance. I also supported her in the preparation of curries. One evening, I asked my wife to sit back and relax so that I would take up cooking. I chopped the vegetables, cooked basmati rice, made a fresh blend of spices that included clove, cardamom, ginger, mint leaves, garlic, and coconut grating and stirred in a mixy. The aroma of vegetables shallow fried in oil, mixed with gravy was indescribably intoxicating. Finally, it was mixed with rice. Few roasted almonds and cashew nuts were added. A cucumber, tomato and onion raitha was the right combination for Cairo Pulav. I named it so because we had purchased a few dry masala powders in Egypt during our trip and used the same here. We had a few fried items as accompaniments.

After a few days of lockdown, we started exchanging snacks in the evening with my brother's family staying in the ground floor. Every day delicious items like eggless cakes, panipuri, cookies, cutlets, poha, pakodas, samosa, etc were prepared and moved between the two houses. This increased the bonding between the two families.



Once my brother called up from Mumbai and asked us to be ready for a game on WhatsApp. He connected relatives from Hyderabad, Bangalore and Mumbai. Teams were made on WhatsApp, instructions were sent and whichever team did the acts meticulously in a very short time became the winner. This was really wonderful. People were asked to wear different slippers, dance, mop the floor, do yoga, munch the snacks, collect the items, etc and upload the same on WhatsApp. My brother and his young daughter staying in the

ground floor of our house were so anxiously doing things in a jiffy. There was so much noise and fun. It was a celebration. We also played some of the indoor games we had long back forgotten.

My wife prepared different types of papad and sandige and the summer was apt for drying them easily on the terrace. Number of Discussions happened over mobile with her mother, sisters and relatives regarding the recipe of an exotic variety of food items. Raw mango pickle was prepared using a number of spices in the right proportion.



“Before the rains” and “Train to Pakistan” are some of the Bollywood movies we watched on Youtube, worthy of a mention here. In the movie “Before the rains” there are a number of foreigners speaking accented Hindi confronted by tribal's or Adivasis and pictured around Malabar region of British India. The picture shows that tribal's in Kerala in those days had strange ways to prove innocence and one of them is the test of fire.

“Train to Pakistan” is about Partition of India and the aftermath. Mano Majra is a fictional village on the border of India and Pakistan close to the railway line crossing Sutlej River. The scene of several dead bodies floating in Sutlej River and train arriving from Pakistan

with all travellers being butchered is heart-rending. This is a movie based on the novel written by Mr. Khushwant Singh.

My colleague showed me a picture of his young son for whom he had done a haircut and explained in great detail telling me how difficult it is to do a haircut and the cleaning process thereafter. He also said he used a scale to measure during the cutting and maintain uniformity all around the head. Another colleague had divided his head into two parts and handed over to his two sons who used all their skills and scissors, blades and brought out a strange specimen. Everyone burst into peals of laughter for scientists finding ingenious ways of doing things.



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Wild Wild Space!!!

The sight of astronauts, over and above their bulky spacesuits, wearing cowboy hats and spitting bullets at each other, may not be a common imagery when we think about space. But in fact, space is pretty much the wild wild west of the bygone days. The guns are replaced by powerful missiles and the horses by mammoth rockets. Lawless and hostile, space is the unwelcoming bull that humans have been trying to tame and ride on for a long time now. We humans as a civilization have fought many a war between ourselves. And we all know that we narrowly escaped a third world war, due to the moon landing which ended the cold war. From the launch of Sputnik in 1957 by USSR, the space technology has grown by leaps and bounds. But unfortunately, Space Law has not matured up to the same levels.

Space Race of the past has been giving way to what is being now called as Space Rush. This advent of Space Rush is attributed to the entry of a lot of private players in the space sector. This sector promises very lucrative returns to private entrepreneurs.

And as there is a sort of crowding of space, the necessity of regulating principles and rules becomes indispensable.

Space is demarcated from an altitude of 100 Km and space law is the body of law that governs the space-related activities. Like other international laws, space law also comprises of many international agreements, treaties, resolutions and conventions. Space is now seeing activities ranging from International Space Stations being set up to plans of colonizing nearby planets. Space tourism and exploration of space for resources are gaining the attention of a lot of space enthusiasts and entrepreneurs. In recent times we have seen anti-satellite missiles being tested, and thoughts of a dedicated space force being in the pipeline. We also have a very grave problem of space debris to deal with.

The various matters addressed by Space law are preserving earth and space environment, sharing of information regarding the potential threat, the rescue of

astronauts, settlement of disputes, the liability of damages caused by space objects, international cooperation, use of space-related technologies, protection of national interest and military activities in outer space.

Fundamental principles have been put in place, to guide the conduct of activities in space, freedom of exploration and use of space by all states without discrimination. Since space law sadly has not matured to the levels it should have by now, there are a lot of grey areas which are under debate and discussion. Law in itself is an evolutionary subject which evolves based on traditions, rationality and experiences. Space law has to jettison itself, to soon be able to answer some tough questions and legal issues like the legal status of space tourists, law governing the aerospace vehicles, unresolved issue of demarcation of airspace & outer space, the legality of exploitation of planetary resources, law governing the financing of private space activities, space insurance, state responsibility and liability for private space activities, liability for a collision between space objects and laws governing access to earth observation data.

Much of the outer space is unexplored hence exhilarating and a region of global importance. Due to its unique nature, space holds the potential for both benefits and dangers. Thus, the major goals of space law are to ensure a rational, responsible approach to the exploration and use of

outer space for the benefit and in the interest of all humankind.

There have been quite a few United Nations resolutions relating to space law. To start with, there was 1959 (Resolution 1472) which established a committee on peaceful uses of outer space. And then in 1961 (Resolution 1721) which brought about two major legal principles applicable to outer space. First, that International law including the charter of UN applies to outer space and celestial bodies, and the second, that, outer space and celestial bodies are free for exploration and use by all states in conformity with international law and are not subject to national appropriation. Then in 1963 (Resolution 1962) dealt with many topics of space law and came out with a framework of guidelines stating that the use of outer space should be for the benefit of all mankind. Freedom of exploration and use of outer space should be in accordance with international law. It also prohibits the national appropriation of outer space and celestial bodies. It demands a solid affirmation from the states that exploration of space should be in the interest of promoting peace and security to humankind. The resolution seeks international responsibility on part of the states for activities in outer space. It also had a very far-sighted vision and assigned the onus of ownership of objects launched into outer space. It provides for international liability of states for damages caused in space. After these United Nations resolutions had been formulated, it set the

way for more specific set of laws to be made. The Outer Space Treaty of 1967 (Charter for Space Law & Exploration) provides for freedom of exploration, peace, international co-operation, scientific investigation, international consultation, the liability of States, non-appropriation, mutual assistance of states, arms control measures and environment protection of outer space.

In the following year, The Agreement on Rescue of Astronauts (1968) was drafted. It talks about providing assistance to astronauts in the event of distress, accident or emergency and prompt return of astronauts and space objects to the launching state. The expense for such work shall be borne by the launching state.

A decade after the moon landing the Moon Agreement (1979) came into force. It categorically states that scientific

exploration of the Moon should be done for peaceful purposes alone. It allows the right to remove samples for scientific investigation. It states that the moon and other celestial bodies and their natural resources are to be regarded as the common heritage of mankind. It explicitly prohibits militarization and weaponization.

Space law in India is in its nascent stage. The need for space law in place, is more than ever now, as India is swiftly moving towards self-sufficiency with its cost-effective space programs and attracting the attention of other nations. India seems to be entering into commercialization by helping other nations in launching their satellite. The development of commercialization calls attention for revising of domestic laws in consonance with international space law and to soon pass the Space Activities Bill. And let us hope that finally, law prevails in space.





Painting



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कला साहित्य पत्रिका

भारतीय अंतरिक्ष विज्ञान एवं प्रौद्योगिकी संस्थान की अर्धवार्षिक पत्रिका

सुरभि: कला साहित्य पत्रिका भारतीय अंतरिक्ष विज्ञान एवं प्रौद्योगिकी संस्थान द्वारा प्रकाशित अर्धवार्षिक पत्रिका है जिसमें कलाकृतियों एवं सर्गात्मक रचनाओं का प्रकाशन किया जाता है जैसे – कहानियाँ, कविताएँ, अनुस्मरण, फिल्मों एवं पुस्तकों की समीक्षाएँ, यात्रा विवरण, भेंट वार्ताएँ, रिपोर्ट, आरेख, छाया चित्र, वैज्ञानिक साहित्य, पेन्सिल ड्रॉइंग, चित्ररचनाएँ आदि। अंतरिक्ष विभाग के विविध केंद्रों के लोगों की सर्गात्मक प्रतिभा को प्रोत्साहन देने में यह पत्रिका विशेष रुचि रखती है। इस पत्रिका में अंग्रेजी, हिंदी एवं भारत की किसी भाषा की रचनाएँ शामिल की जाती हैं। पत्रिका में प्रकाशन के लिए उपर्युक्त प्रकार की रचनाएँ आमंत्रित की जाती हैं।

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आप अपनी रचनाओं की सॉफ्ट कॉपी सह संपादक को निम्नलिखित ई मेल पते पर भेज दें। /
You may please send soft copies of your submissions to the Associate Editor to the following e-mail ID:

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