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SUNITA RAO



Cover art by Sonali Zohra

Can communities play a role in conservation? And should they?

In our cover story, Katie Bodowski offers us suggestions for better orangutan conservation in Southeast Asia with the community as a conservation partner. Aarthi Sridhar writes about the traditional Mural fishery in the Palk Bay region of India proving that we can learn a lot about sustainability by studying local adaptations. John Kurien discusses the almost revolutionary steps taken to initiate community-based fisheries management in Cambodia.

This issue also launches two new columns. Michael Adams challenges us to re-examine our understanding of what ideal ecosystems look like while Rohan Arthur debates the efficacy of public dissent. Our regular column COP Watch continues with a look into the implications of the USA backing out of the Paris climate accord.



Maithili Panikar

In this issue of CC Kids, we explore the power, perfume, and profusion of plants, travelling from your back garden to the very roof of the world.

In our feature article and Fun Facts column, Sunita Rao enters the dark realm of an underground denizen - the tuber. Not only do they come in a variety shapes and sizes, but also flavours! Why not try the recipes Sunita suggests?

Then Shweta Basnett takes us high into the Himalayan mountains with the story of the beautiful blooms she finds there, and the diversity of life they support.

Come with us on this extraordinary tour of India's botanical bounty!

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Cambodia's community fishery institutions

Cambodia's vast aquatic milieu is part of the larger Mekong River Basin and its fertile floodplains. At the heart of this area is the Tonle Sap Lake— the largest freshwater lake in South-East Asia and the most productive and bio-diverse freshwater zone in the world.

The Tonle Sap River flows out from the Lake and joins the Mekong at Phnom Penh the capital of Cambodia. During the peak flooding season from June to September the seasonal monsoon causes the Mekong and its tributaries to spill out of their channels.

The flooding is so heavy that the flow of the Tonle Sap River is reversed back into the lake inundating huge areas of forest and grassland across the country. When this happens, the Tonle Sap – now designated a UNESCO Biosphere Reserve – grows from about 2500km² to cover over 16,000 km² or about 7 per cent of Cambodia's land area.

Tonle Sap teems with fish that nourishes Cambodia's population, who are the world's largest consumers of inland fish. In 1873 the French Protectorate introduced tenure rights to the most productive parts of the Lake by auctioning licenses to individuals to erect fish enclosures called 'fishing lots' over vast areas of the lake.

Lake and Genocide

The Tonle Sap was also mute witness to the genocide of the Pol Pot regime in the 1970s. The populations around the Lake were uprooted and scattered far and wide to realise his dream of making a communist state, based exclusively on a rice growing proletariat subsisting on state welfare. Many Vietnamese fishers and Khmer farmers who were educated and fishing lot owners were killed for fear that they would rise against the state. Fishing came to a standstill.

The Pol Pot vicious regime was defeated in 1978. Cambodia slowly returned to the democratic mainstream in 1993 only after over a decade of 'socialist' rule. The fishing lots gradually reappeared and their auctioning by the state was revived as it did form sizeable revenue – between USD 2 and 3 million per annum. Fishing lot owners became a rich and privileged group. Many former military men also got involved. They jealously protected the lots from ingress by the

large displaced Khmer peasant population who settled around the Lake after Pol Pot. Conflict over access to fish became endemic. Many deaths were reported.

Aquarian Reforms and Community Institutions

This situation was altered drastically in October 2000. Cambodia's Prime Minister made an unexpected announcement cancelling half of all fishing lot licenses, including those belonging to a few hundred powerful individuals. He turned over the rights of access to thousands of poor rural families to harvest fishery resources for food and livelihood. It was an action which yielded important political rewards for the Prime Minister in the next elections in 2003.

This was a state-sponsored aquarian reform backed with legal protection. The Fisheries Administration (FiA) was asked to start a Community Fisheries Development Office to assist the





riparian communities with setting up new community fisheries institutions (CFi). Civil society organisations and international development partners were encouraged to help out.

CFi are spatially demarcated areas of flood-pulse land and water terrains. This realm is first roughly charted out by a group of founders. Concrete boundary markers are placed at points which are perennially under water. A democratically elected team from among the group of founders is designated as the CFi Committee. It is their task to make the CFi function as a modern riparian commons. Each CFi is encouraged to prepare their own management plan to chart out how they will utilise and conserve their common domain and its resources.

The technology of fishing lots was ecologically sound. It is just that due to the ownership pattern the overall benefits from the fishery were accruing to just a few. In the CFi the fishers only use what are designated as 'family-scale' fishing equipment. Basically these are nets, traps and hooks of limited size which can only harvest small quantities of fish just adequate for home consumption and sale for a little cash.

Assessment

An assessment made in 2012 of the 450 CFi established by then demonstrated that the aquarian reforms resulted in a much wider

spreading of the benefits gained from the huge teeming fishery resources of the Lake and also the other riverine and marine areas brought under the CFi regime.

Leading the list of benefits was the greater quantities of fish consumed by the rural population – particularly the children. Secondly, the use of the small cash incomes from sale of fish contributed to family expenditures such as children's school books; covering minor health costs; minor repair of homes; purchase of rice in the lean season and such like. For the rural communities such small but crucial expenses made significant differences in their lives. Knowing that all this comes from resources over which they have collective control is a great source of empowerment.

There have also been tangible improvements in the local ecosystem through the collective efforts of the CFi members to protect the flooded forests, plant mangroves, stop destructive fishing and other conservation measures. The structured role of women in the CFi committees provided new avenues to gradually bring in more gender equality in the communities. Some of the best functioning CFi are marked by the greater participation of women in them.

Noting these small but significant nutritional, economic and social benefits which widely accrued to the communities from his earlier policy pronouncements,

the Prime Minister completed his reforms by taking over the remaining half of the fishing lots. Some were converted into exclusive conservation zones in the Lake, which in his words were, "to protect the lake's pressured wild fisheries on which tens of thousands of subsistence fishermen rely."

The Future

Today there are over 500 CFi in Cambodia. The majority are around the Tonle Sap. Their commons covers over 850,000 hectares spread across 19 of the 25 provinces of the country. There are 188,000 commoners of which over 61,000 are women. Not all the CFi in Cambodia function as 'lively commons'. Many remain 'empty shells' for lack of leadership and timely support from civil society and development partners.

Yet the future is bright. The framework for a modern commons and the rich experience of 15 years of thousands of commoners is huge social capital which can be tapped with the right facilitation and support. The riparian communities and the Royal Government of Cambodia are committed to this.

John Kurien is currently Visiting Professor at Azim Premji University, Bengaluru. He has been associated with Cambodia's community fisheries initiative since 2005.

**Does conservation
success depend on the
local community?
A review of community-
based orangutan
conservation in
Southeast Asia**



While walking through the rainforests of Borneo and Sumatra it won't be long until you come across some amazing sights, sounds, and smells. Leeches inching up your legs, the loud hoots of gibbons, and the sweet smell of wet soil after a downpour. Keep looking up and if you're lucky you might see a glimpse of red hair high in the canopy. Asia's only great ape, the orangutan, is an iconic species of Southeast Asia but is, unfortunately, becoming a rare sight in the wild.

Two subspecies of orangutans live in Southeast Asia: the Bornean orangutan (*Pongo pygmaeus*) and the Sumatran orangutan (*Pongo abelii*). They are the only great apes found in this part of the world and spend most of their lives high in the rainforest canopy dining on fruit, leaves, roots, and flowers. As their survival depends on healthy forests, deforestation has had a devastating effect on orangutan populations. In the year 2000, Bornean orangutans were listed as endangered on the IUCN list, while Sumatran orangutans were classified as critically endangered and are predicted to go extinct by 2100 if conservation efforts are unsuccessful.

Habitat loss is the biggest threat to orangutan populations and palm oil is the biggest culprit. Palm oil is a type of vegetable oil used in food such as biscuits, chocolates, packaged food, and bread, in addition to soaps and cosmetics like lipstick and toothpaste. Because palm oil is used in so many products, the high demand for it is responsible for destroying

much of Southeast Asia's rainforests and biodiversity. The areas primarily cleared for palm oil plantations are the peat forests and lowland forests, which are unfortunately the preferred habitat for orangutans. As little as 40 years ago both Borneo and Sumatra were covered in forests, but today the landscape has drastically changed and only small pockets of forests remain. Orangutans struggle to survive in these fragmented forests as they eat, sleep, and travel through the trees, rarely touching the ground. The number of orangutans has plummeted from over 230,000 to around 25,000 individuals in 100 years. To make things worse, loggers, poachers, and palm oil farmers have now started to encroach on the last few refuges for struggling orangutan populations.

Habitat loss is not the only threat orangutans face, poaching and the illegal pet trade are also

threatening their numbers due to the high demand for bushmeat and exotic pets worldwide. Both industries go hand-in-hand as adult orangutans are killed for bushmeat and their babies sold as illegal pets. Law enforcement is minimal in Indonesia so despite having complete wildlife protection laws, Indonesia's law enforcement is notoriously weak and ineffective. In addition, the majority of primates being kept as pets are by local people, suggesting the need for more education and law enforcement in local communities. All of the threats to orangutan populations are interconnected and require both local and global intervention to address them.

Community Based Conservation

Community-based conservation (CBC) is a tool currently used

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by NGO's and governments to address the threats to orangutan populations in both Borneo and Sumatra. CBC started to evolve in the 1980s when scientists saw the need to incorporate human welfare into conservation. Traditional conservation methods involve creating protected areas off limits to humans, but despite having more protected areas in the world today than we've ever had, we continue to lose species and habitats at an alarming rate. Conservationists and social scientists are realizing that displacing local people from their homes to create protected areas is not effective. Instead, teaching local people to coexist with wildlife and the resources they share has had better results.

A community-based approach can be changed to address threats and create solutions for the many different landscapes, cultures, species, and communities in need of help. CBC programs are currently succeeding for various species in multiple countries including the black rhinoceros in Namibia, cotton-top tamarin in Colombia, and Grevy's zebra in Kenya. Despite some success, for conservation to become a social priority more people need to understand that conserving their native environment is in their best interest and that without nature, people cannot survive.

CBC efforts for orangutans; are they effective?

To conserve native species and their habitats, it is imperative that humans coexist with orangutans and other wildlife.

Coexisting not only benefits the native species but also the native peoples. Without seed-dispersing orangutans, the forests people depend on would not thrive, the tourism industry imperative to the economy would collapse, and Indonesia's most iconic species would disappear. Currently, conservationists use four main strategies to address threats to orangutans: fighting illegal trade and poaching, managing protected habitat, establishing orangutan friendly management in areas such as palm oil plantations, and rehabilitating and releasing orphaned and injured orangutans. All of these strategies involve some form of community-based conservation as local communities move closer to the last patches of forests left in Borneo and Sumatra.

Roundtable on Sustainable Palm Oil

Palm oil is a very profitable crop;

it is widely used and has created many jobs which have improved the lives of poor communities as many plantation owners provide their workers with healthcare, salaries, housing, and schooling. Despite having some benefits, it is the leading cause of deforestation in Southeast Asia and the biggest threat to the survival of orangutans. To help reduce the destruction caused by palm oil plantations on the ecosystem a non-profit organization called the Roundtable on Sustainable Palm Oil (RSPO) was established in 2004. RSPO provides financial incentives to boost the growth of sustainable palm oil worldwide and includes members from plantation companies, manufacturers of palm oil products, retailers, banks and investors, and environmental and social NGOs. RSPO has created a list of environmental and social criteria that must be met by companies in order for their palm oil to be considered



Sonali Zohira

‘sustainable.’ These guidelines help to minimize the destructive nature of palm oil plantations on both the environment and local communities in the region.

There are many branches to the RSPO non-profit; one of these involves community-based programs that provide tools and education to the local communities. In Indonesia, RSPO certifies small plantation owners so they have the knowledge and ability to produce more palm oil using less land. RSPO gives the farmers the opportunity to raise their income by offering access to training, education and funding that allows them to provide for their families while helping to protect biodiversity in the region. The RSPO community-based programs benefit the local people by providing many resources to better their families and livelihoods while working to create more sustainable practices to protect the environment now and for the future.

Education and empowerment in the community

Community environmental education (CEE) and community empowerment strategies are both powerful tools used in CBC efforts in Southeast Asia. Both strategies encourage local communities to become involved in managing their natural resources in ways that benefit them and their environment. Education is one of the most powerful tools in conservation as it allows people to gain awareness, skills, and knowledge, while providing opportunities to participate in

Education is one of the most powerful tools in conservation as it allows people to gain awareness, skills, and knowledge, while providing opportunities to participate in decision-making. Once people understand their environment and are aware of how its problems affect them, they are more motivated to work towards finding solutions that better their community and support the wildlife they cohabitate with.

decision-making. Once people understand their environment and are aware of how its problems affect them, they are more motivated to work towards finding solutions that better their community and support the wildlife they cohabitate with.

Hutan, a french NGO based in Sabah, Malaysian Borneo is one of the successful CBC programs supporting orangutan conservation. Beginning in 1996, Dr. Marc Ancrenaz and Dr. Isabelle Lackman have spent over twenty years in Sabah trying to build the trust of the locals while working to conserve the area’s wildlife. They partnered with the Sabah Wildlife Department to create The Kinabatangan Orangutan Conservation Project (KOCP) and after eventually gaining the local people’s trust, they got them involved in the conservation efforts. Hutan-KOCP integrate scientific research, community

engagement, education, and capacity building to conserve the wildlife living within and around the Kinabatangan Wildlife Sanctuary. They involve the local community in every aspect of their program from hiring local people to monitor the native wildlife, manage the sanctuary, collect scientific data, and conduct anti-poaching patrols, to holding community meetings, offering environmental education classes, and awarding the community exclusive rights to develop ecotourism within the sanctuary, including a homestay program in the village. Since the program’s establishment, there has been a significant decline in the unsustainable use of forest resources and an increased understanding of the importance of protecting the rainforest and its wildlife. A program called the Wildlife Wardens gives eighteen highly trained local people the power to arrest poachers and illegal loggers, allowing them

to have a hand in protecting the natural resources and wildlife they depend on. So far, the programs and opportunities Hutan-KOCP provide have been effective in engaging the local people in sustainable behavior, creating a sense of pride in the community, boosting the local economy, and has created 26,000 ha of protected forests in the area.

The future

CBC largely depends on the willingness of the local community or village to take responsibility to preserve and protect their natural resources. Successful CBC projects have two things in common: they work at a community scale, and the community has been properly prepared to manage the project or most aspects of it on their own. A community-based program is considered successful if there is a change in human behavior over time and the local communities show the ability to sustain the conservation project with little or no oversight from the NGOs. To be successful, NGOs must provide more than just information and awareness of sustainable practices; they must offer new skills and give communities the opportunity to practice new behaviors and take action themselves.

Due to their charismatic nature and similarity to humans, orangutans have become the ambassador species for conservation in the battle against unsustainable palm oil and deforestation in Indonesia. Local communities have to be dedicated to protecting the only great ape living in Southeast Asia and work collaboratively with NGOs to ensure they are around for the future. Conserving biodiversity can only be achieved through changing human behavior, as humans are the main cause of biodiversity loss, to begin with. To change human behavior, understanding the needs and wants of the community is important. Tools and programs such as RSPO, education, alternative livelihoods, and creating a sense of pride in the communities are used by NGO’s to try and protect the last populations of orangutans in Indonesia.

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Katie Badowski is a graduate student at Miami University studying biology with a focus in wildlife conservation. During her master’s coursework she spent time in Sabah, Borneo working on community-based conservation projects involving orangutans, reforestation, and community education.



Palk Bay's *mural*

The generic local name, *mural*, refers to a group of fishes found in the Palk Bay in southern Tamil Nadu, India. It comprises ray-finned fishes such as halfbeaks and needle fish (distinguished from halfbeaks by their long needle shaped jaws). This group of fishes are often not listed in country-level statistics as having any commercial value merely on account of the fact that European consumers do not find its green flesh appetising. However, these tropical fish are consumed in many domestic markets across the world and the freshly prepared fish is a delicacy obtained only in the coastal towns of Palk Bay.

Early records of studies conducted by CMFRI scientists show that nearly all villages of the Palk Bay were involved in this fishery. Fishers corroborate this, stating that many fisher families knew the techniques of making the special mural nets (*mural valai*). Today, mural valai specialists are found mainly in Mullimunai and Morepannai although some families in Kollukadu continue to teach this technique to younger generations. This net is now mostly made by older men and women since it is a time-consuming operation that requires being at home for long hours. Each net takes about a full week to complete.

Found all along the Palk Bay, mural nets are highly specialised and often small modifications are made to the nets to adapt to local conditions of the sea. These nets are used in the Palk Bay but also in coastal villages of the Gulf of Mannar. The floats of this net are made of the stems of the calotropis plant (*Calotropis gigantea*) and no sinkers are used, making this net a floating gill net. The net is deployed a few hours after midnight and retrieved a few hours later.



Certain aspects of the mural's behaviour are understood well by fishers. They observe the speed and direction of its movements, that it likes eating small shrimp, seagrasses and other animals and that it likes staying close to the surface of the water. These observations define the designs and deployment of nets in specific areas. Halfbeaks like the selvai mural (*Hemiramphus far*) are often seen at the surface of the water and they are usually caught in the mesh by their gills. The mesh material used in the mural net becomes almost transparent in water and the unfortunate fish following certain currents is tricked into swimming right into it.



Techniques in fishing depend on a large number of factors and these are difficult to establish without deeper enquiries and study. The commercial value of the mural depends on its tender meat. Its good colour is also considered an added advantage in some markets. In order to remove the delicate mural fish from the net, it is necessary to ensure that it does not struggle too much. Therefore, a fisherman must enter the water to extract the fish from the net directly and minimise its resistance.

Scientists distinguish species of needle fish from one another based on small morphological differences. The shape of the beak, markings on the body, length and shape of the caudal fin as well as colouration, pigmentation, length of pectoral fins, number of rays in the fin and so on are examples of such morphological features.

Vernacular names of mural often do not overlap with these scientific distinctions between different species of fish. For instance, the local name *belt mural* refers to the species known to fisheries scientists as *Ablennes hains* which has distinct bands through the length of its body. However, for species that do not have very clear distinctions a more generic name is used. For instance, the *kalinga mural* refers to fish that belong to the scientific genus *Strongylura* but in contemporary times no further distinction is made between species of this genus. Experienced fishers often make fine distinctions between species, but unless these distinctions are identified and passed on to newer generations of fishers, traders and other actors involved in fisheries, such information is likely to get coarser as time passes on.

Aarthi Sridhar is Trustee and Programme Head, Dakshin Foundation and a doctoral candidate at the University of Amsterdam.

Umeed Mistry is an award-winning photographer and PADI Staff Instructor.

For more stories on the Palk Bay, see our book *Knowing the Palk Bay* produced with funding support from the German BMUB through the GiZ. For a copy, write to admin@dakshin.org

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kids

FLOWERS AT THE ROOF OF THE WORLD – THE PLANT AT THE HEART OF HIMALAYAN LIFE

When I am at my study site, every day begins with a wake-up alarm call at 4.45 AM. I sneak a quick look outside the window and observe the sky to plan for my day's work. A clear blue sky suggests an exciting day ahead. I work in Kyongnosla Alpine Sanctuary, between 3200m and 4200m above sea level. This high elevation region in Sikkim is home to many flowering plants, among them the colourful Rhododendrons that are world famous for their stunningly beautiful flowers.

These trees are not only a visual extravaganza, a resource for the heart and soul, but they also provide the physical resources equally vital for life. They are cover for many wild animals such as goral, Himalayan black bear, red fox, yellow-throated martin, red panda, and the iconic snow leopard. They

provide nectar and pollen to many birds and several tiny insects. One can also see pika (a small rodent resembling a rabbit), musk deer, and other ungulates feeding on the Rhododendron flowers. In addition, the leaves and flowers of some Rhododendrons are used for making incense and wine. Supporting so many life forms, as well as the local economy, no wonder they are called the “tree of souls” of this region. In my research, I study 10 Rhododendron species. I am especially interested in understanding the timings of events such as budding, flowering and fruiting of these plants and the role played by climate and pollinators in those events. I record the dates when the Rhododendrons produce buds and flowers, and then later I record the dates when they produce fruits and seeds. I also observe the pollinators of various shapes



and sizes who come to visit the Rhododendron flowers.

The flowering of Rhododendrons in Kyongnosla starts during early May when the temperature rises, melting the snow cover in this region. I start my daily trek with my field assistant, Sonam, at 5:10 AM and reach the closest field site in an hour. When the ground is under nearly 2 to 3 feet of snow it is

impossible to recognize the usual trails. That is when Sonam's advice to observe the footprints of wild animals, and especially of the Himalayan black bear, comes in handy. Yes, bears always help us discover the right path there and back! As we climb higher into the mountains we are welcomed by cold winds, and freezing weather. As the temperature starts dropping, our fingers become numb, making it tough to enter observations in our notebooks. However,

Sonam always has suggestions to survive in the chilly weather. He knows the location of caves and other warm areas inside the forest, and we light a fire with dry leaves, even though it barely lasts for a few minutes. But in spite of this harsh weather, we are among the lucky few who can enjoy the breathtaking views of the valleys full of flowers and the clear blue sky, surrounded by the third highest peak in the world.

The climbing, altitude, and cold all mean that this



can be hungry work. And just like us, plants need food to survive here too. Their food is in the form of rain water, sunlight and nutrients from the soil. But unlike us, plants cannot move in search of food or favourable conditions. So they wait for the time when the conditions are right for them to grow and produce leaves and flowers. Before they can produce seeds, most plants must first be pollinated. This means that they must have pollen from other flowers of the same plant as well as other individuals of the similar plant type delivered to them by more mobile species. In the case of Rhododendrons, birds act as pollinators at lower elevations, where it is slightly warmer, while insects such as bumblebees pollinate Rhododendrons that grow higher up, near the mountaintops. This is because many birds cannot withstand the very cold temperatures that bumblebees can. These bees have hairy bodies, which helps them cope with the extreme cold temperatures.

I am finding that temperature is the main thing that determines the flowering time of Rhododendrons. Rhododendrons wait for the right temperature conditions before they flower. This starts around May at lower elevations, and can be as late as June as you go higher up the mountains. This is also the time when the numbers of pollinators, such as birds and bees, are greatest.

These plants are highly adapted to the extremes of their mountain home. In fact, if conditions were to get



‘easier’, this could actually cause them problems. For example, if temperatures increase with climate change, then these Rhododendrons might start to flower earlier. If that happens they might not meet their pollinators. If plant and pollinator are out of sync, then both suffer. This could have important implications!

The future for the species that live in this high altitude world is uncertain and we still have a lot to learn. I hope that through my work I may be able to uncover some of the mysteries of life at the heart of this mountain realm.

Shweta Basnett is a PhD student at ATREE and is interested in Evolutionary Biology. She is studying the flowering phenology of high altitude Rhododendrons and its interaction with the pollinators.

“T” FOR TUBER AND TUBERS FOR TEA

Lakshmi Siddi lives deep in the thick, evergreen forests of the Western Ghats of India, in a region called the Malnad. Her home is located on a little lip of land sticking out of a forested slope. She and her family have an orchard and kitchen garden that they tend. A stream flows by at the bottom of her land, where her son and his friends often go to catch fish using bamboo traps. This is an idyllic setting, but tough since you have to hike many kilometres to get to the nearest bus stop to go anywhere. When the monsoon rain comes lashing down, you also have to deal with blood sucking leeches.

Hardly any sunlight reaches Lakshmi’s forest food garden and she cannot grow the usual range of vegetables that need a lot of direct sunshine. But she does have some hidden treasures in there that live and grow underground. They make it from her garden to her kitchen, becoming part of the delicious foods that Lakshmi cooks and loves to serve her family and friends. These underground denizens are tubers which are an important part of the local cuisine.

Tubers thrive in the shade, are very hardy and are both tasty and nutritious. There is a huge diversity of tubers and they come in a variety of shapes and sizes.

When tubers are mentioned, many of us only think of potatoes and stop there. The truth is that we have more native tubers in India than we might



have ever imagined. Each of them is special and can be made into countless dishes. Move over potato chips and aloo gobi. Enter with pride tuber biryani, tuber sambar, tuber sabzi, chutney and puran poli, tuber raitha, papad, pickle and chips. Even tuber ice cream!

If you want to get totally tubered, consider Taro (*Colocasia* or Arbi) of which at least 10 varieties grow where Lakshmi lives, Elephant Foot Yam (*Amorphophallus* species), Tapioca, Sweet Potato, wild Arrowroot, Turmeric and Ginger. And these are just some of the possibilities. Tubers provide generously too. Some yams, for example, may look like a simple, little plant above ground, but this could be just the visible part of a huge, 6 foot long underground giant, branching out in all directions, almost like octopus arms!

In a bid to make tubers more popular and people aware of their goodness, Lakshmi and her friend Renuka recently carried two sackfuls to the city

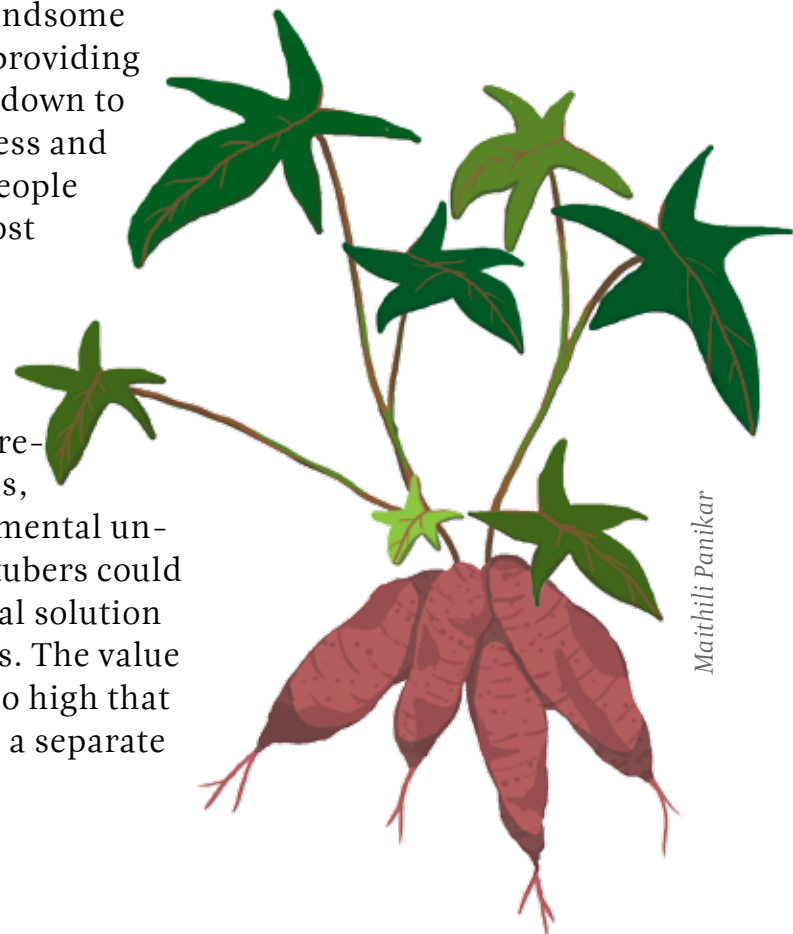
of Bengaluru. They participated in a seed and food festival there called the Malnad Mela. They had a splendid time with visitors, who learned all they could from these mistresses of tubers. Lakshmi and Renuka felt it was important for them to make people see that tubers are an important food source for the present and future. They were eager to help people remember again a forgotten food and to encourage them to put it back on their menus. When the women did a tally of their earnings, they had made Rs. 11,000 in two days. A well-deserved, handsome amount for providing wholesome, down to earth goodness and wisdom to people before it is lost forever.

In this age of climate change, unpredictable rains, and environmental uncertainties, tubers could provide a vital solution to food crises. The value of tubers is so high that there is even a separate

institution of scientists dedicated to discovering more about them — the Central Tuber Crop Research Institute in Kerala.

So, the next time you are near a sabziwallah or the market, do look for these marvellous vegetables and try them out at home. You and your family may be in for some nice surprises.

In the meanwhile, in Lakshmi's part of the planet, where the forests and rivers are still healthy and human communities are closely connected to nature, tigers occasionally roam where tubers dare to grow!



Lakshmi Siddi's Arbi YumYum

"I am not sure how old this recipe is, where it came from or how it survived this long. I do know though that generations of children and grandchildren have enjoyed this dish. I hope the kids reading this try it out for themselves and tell us their experience."

Traditional version

- Roast the tubers on live coals so they get cooked from the inside and the outer charred skin easily comes off.
- Add salt and tamarind
- Add pepper or chilly powder (optional)

Enjoy!

Note: Roasting preserves the nutrition and taste better than boiling the tubers and throwing away the water. Tamarind helps break down the calcium oxalate crystals in arbi that cause your throat to itch.

Present version

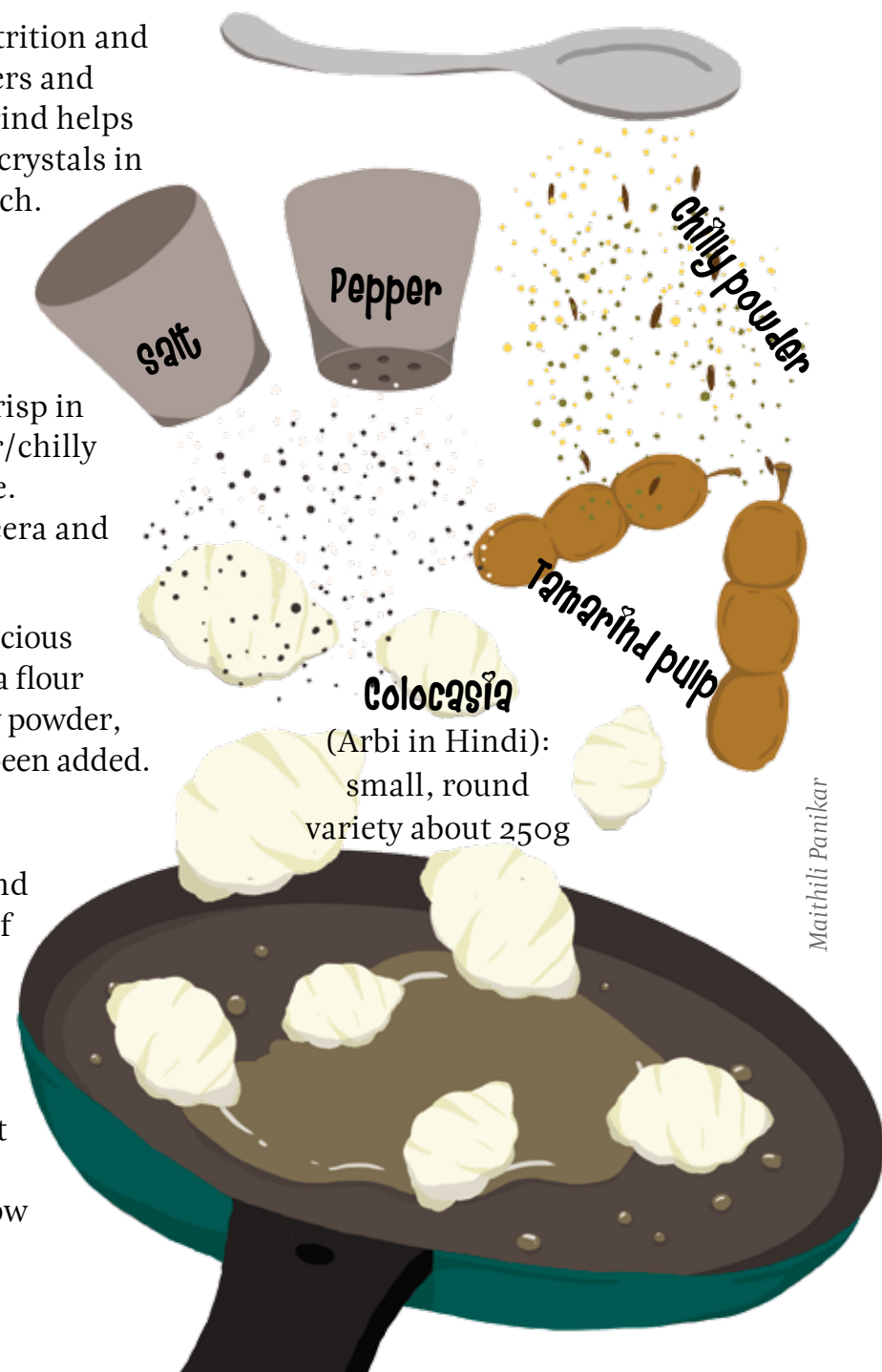
- Boil the arbi in water
- Drain and peel
- Shallow fry till roasted and crisp in some oil and add salt, pepper/chilly powder and tamarind to taste.
- Some people add turmeric, jeera and coriander seed powder too.

Lakshmi says that arbi makes delicious bondas when dipped in a chickpea flour (besan) batter to which salt, chilly powder, tamarind, and other spices have been added.

Wanted: Tuber Chefs

Have a tuber recipe to share? Send it to us and you may find yourself starring in a Tuber Cook Book that is being created by Lakshmi and her friends. All selected contributors will get a copy of the Tuber Recipe booklet when it comes out! Please do give us the name of the tuber and exactly how you cook it when writing in.

Ingredients:



TUBERS TID-BITS

People forage for tubers in the wild or grow them in gardens. Tubers can even be grown in pots in an urban home and need little care.

For the amount of energy required in planting and caring for the tuber, the yield is high and far surpasses what we get with many other regular crops. Tubers don't need synthetic fertilisers or pesticides to grow.

Tubers are not afraid of drought. They will stay quietly underground when conditions are harsh, and go about their business of growing and providing when the time is right.

Tubers also lend themselves to a variety of traditional and modern foods across the Indian sub-continent and the world over. A tuber cook book would cover a wide range of dishes and run into hundreds of recipes!

Tubers have medicinal value too that older members of agricultural and forest communities know about. For instance, arrowroot tubers are harvested, dried, powdered and used as baby food or for convalescents. Arrowroot powder is also used to relieve diarrhoea and dysentery while Elephant Foot Yam is eaten to treat piles.



THE TALE OF TAPIOCA:

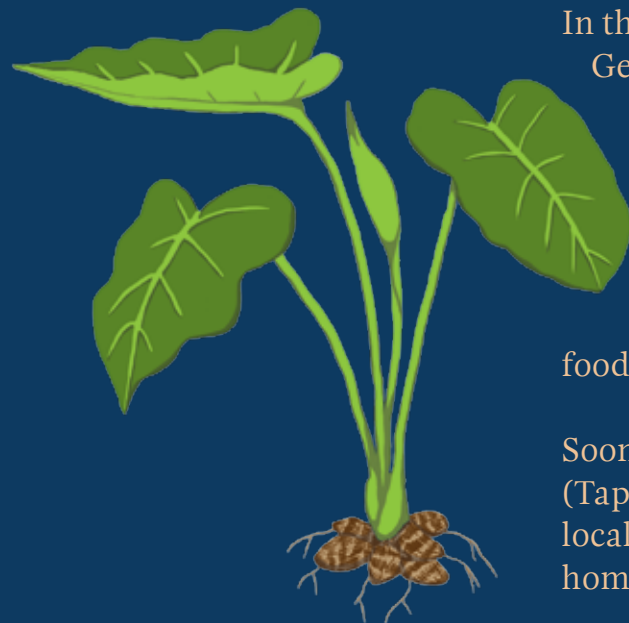
Tapioca (Cassava) is originally from South America

In the Malnad, the local name for Tapioca is Baragala Genasu — the drought tuber.

It certainly lives up to its name, growing fiercely where other plants have difficulty or just die.

During World War II, the Maharajah of Travancore promoted the growing of Tapioca to tide people over food shortages in his kingdom.

Soon it became integrated into the cuisine there and Kappa (Tapioca) and fish curry became an important part of the local diet. Tapioca is still a popular plant grown in many home gardens of Kerala.



Dirty Ecologies: the Black Marlin in Allens Creek

The shaky video shows the arc of its tail scything through brown water as the Black Marlin swims through the creek, hunting bream and tailor. The phone camera pans around and the built structures of the Port Kembla steelworks frame the scene, heavy trucks rolling over a concrete bridge, smokestacks and factories crowding the landscape. The most polluted creek in the Illawarra region of south-east Australia, Allens Creek flows through the steelworks, its banks lined with concrete and weeds, its waters littered with plastic, broken glass and rusting steel. Recently steelworkers watched amazed as that Black Marlin hunted in the shallow waters inside the steelworks itself.

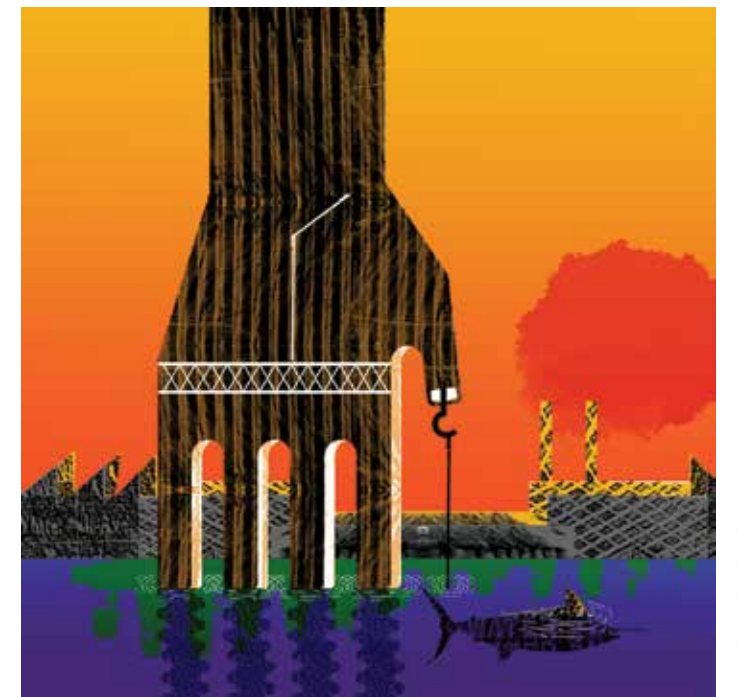
The Black Marlin is an apex predator of oceanic environments, a wide ranging ocean swimmer that can grow to 800 kilograms. Regarded as the premier game fish amongst anglers, they epitomise the oceanic wild - fast, powerful and beautiful. The waters and banks of Allens Creek are a complex amalgam of industry, abandonment, toxicity, flourishing and decline. From the position of the dominant material logics of power and capital, these are the increasingly forgotten, ignored or avoided places. The presence and agency of the Black Marlin in the middle of the steelworks brings into focus debates about the nature of nature in the twenty first century. The giant ocean fish

swims into the heart of industrial Port Kembla not because it is disoriented, but because the 'dirty ecologies' of this human-transformed environment provide resources and shelter. Patricia Yaeger (2013) discussing the amazing film *Beasts of the Southern Wild*, argues

"The film's rags and wastelands—its killing fields—become powerful emblems of the Southland's (and our nation's) commitment to toxic inequality... The citizens of the Bathtub practice a dirty ecology, making do with what they can salvage from other waste-making classes."

The imagined community of the Bathtub, lost in the interstices and floodzones of the modern

Some scientists, environmentalists, humanities scholars and artists are rethinking the nature of nature. I want to argue that all environments are still whole environments, that the whole is constantly reassembled, reorganized, from whatever are the available constituent parts and processes.



Aindri Chakraborty



Aindri Chakraborty

American juggernaut, reflecting class and racial neglect, is, like Allens Creek, simultaneously full of life and energy. Both the humans and the non-humans living in these environments thrive or struggle with repurposed elements from other ecologies. The toxic dirt and debris of the steelworks waterway are the hidden byproducts of the glistening steel towers in modern cities; the marginalised workers fishing in these waters are increasingly discarded by the processes of capital and automation.

All this of course is not so far from jugaad. Radjou *et al* (2012) define some underlying principles of jugaad as seeking opportunity in adversity; doing more with less; thinking and acting flexibly; simplicity and 'heart' – elements

of these easily map onto both human and other ecologies. Around the world, many human communities approach innovation and change through the same principles that define jugaad.

The powerful presence of the Black Marlin highlights for us what water and its denizens might have to teach us. How do we learn in these interstitial environments? What are the seen and unseen processes of respect, reciprocity, generosity and humility between humans and non-humans in these liminal zones? How is the ocean water itself, covering 71% of the planet and containing 99% of its inhabitable area, a key learning opportunity for us?

In much of both popular and

scientific discourse there is an increasingly insistent environmental story of damage, extinction and decline. Simultaneously, some scientists, environmentalists, humanities scholars and artists are rethinking the nature of nature. I want to argue that all environments are still whole environments, that the whole is constantly reassembled, reorganized, from whatever are the available constituent parts and processes. This idea of new ecologies emerging from pre-existing and new constituents has been discussed by a number of researchers. In 2013, the edited volume *Novel Ecosystems* (Hobbs, Higgs and Hall) presented a range of perspectives, Emma Marris's book *Rambunctious Garden* (2011) had earlier explored the challenge

Part of the opportunity for learning is to honour the knowledge of those vernacular worlds. Another part is to trust our own embodied, intuitive understandings, our affective and emotional responses, our ancient ways of understanding that lie beneath the more recent cognitive processes.

of 'saving nature in a post-wild world', and George Monbiot's *Feral: Searching for enchantment on the frontiers of rewilding* (2103) also provocatively explored these ideas.

The spaces of Allens Creek, marine aquatic and terrestrial, have rewilded themselves. New communities flourish here, made up of both pre-existing species and new arrivals. These are the unguarded, unmanaged spaces where lives can flourish and decline often unobserved by the auditing eyes of power. The human observers of the Black Marlin are working class men, steelworkers and fishers who occupy marginalised spaces in society. These are people for whom much of their learning and knowledge is embodied; they carry their skills in their hands. Fishing is a working class recreation, but one with often very high levels of knowledge and embodied skill.

In a world where many human societies are increasingly narcissistic, where our only concern is ourselves, the

appearance of the Black Marlin in the steelworks is a transcendent experience. Perhaps our task is to harmonise ourselves with these old and new environments, not continually attempt to 'manage' them into some other state that we in our hubris think is more desirable, whether ecologically or economically. Part of the opportunity for learning is to honour the knowledge of those vernacular worlds. Another part is to trust our own embodied, intuitive understandings, our affective and emotional responses, our ancient ways of understanding that lie beneath the more recent cognitive processes.

The waters of the Blue Planet are simultaneously and paradoxically both vulnerable and damaged, and unlimited in their power to damage and make vulnerable. The South Asia floods, almost invisible in world media next to Hurricane Irma, bring this home yet again to the world's most populous region. Our shared material bodies: humans, the Black Marlin, the

ocean water itself, are composed of the same elements: each is a rearrangement of the other, and each will be rearranged again as they die and return to the matrix from which the next lives will grow. Embracing humility, listening, slowness, might transform our practices of care through making space for others, helping others endure, moving our human selves to the edges instead of the centre.

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Michael Adams is Associate Professor of Human Geography at the University of Wollongong, Australia. He was born in India. His research includes work with indigenous communities and conservation and heritage management in Australia, Arctic Scandinavia and India.

COP watch

The format of this issue's COP Watch is somewhat different to our original plan. This is because one enormously significant event has occurred since the last issue of CC, which we felt deserved our full attention. On the 1st June 2017, the President of the United States of America announced that the USA would be withdrawing from the Paris climate accord, claiming that the agreement "disadvantages the United States to the exclusive benefit of other countries" and would result in "vastly diminished economic production".

The USA is the World's largest economy and the 2nd biggest emitter of CO₂, contributing 14.9% of global emissions in 2015¹, so their withdrawal would have major implications for future increases in global temperature. We have three main questions:

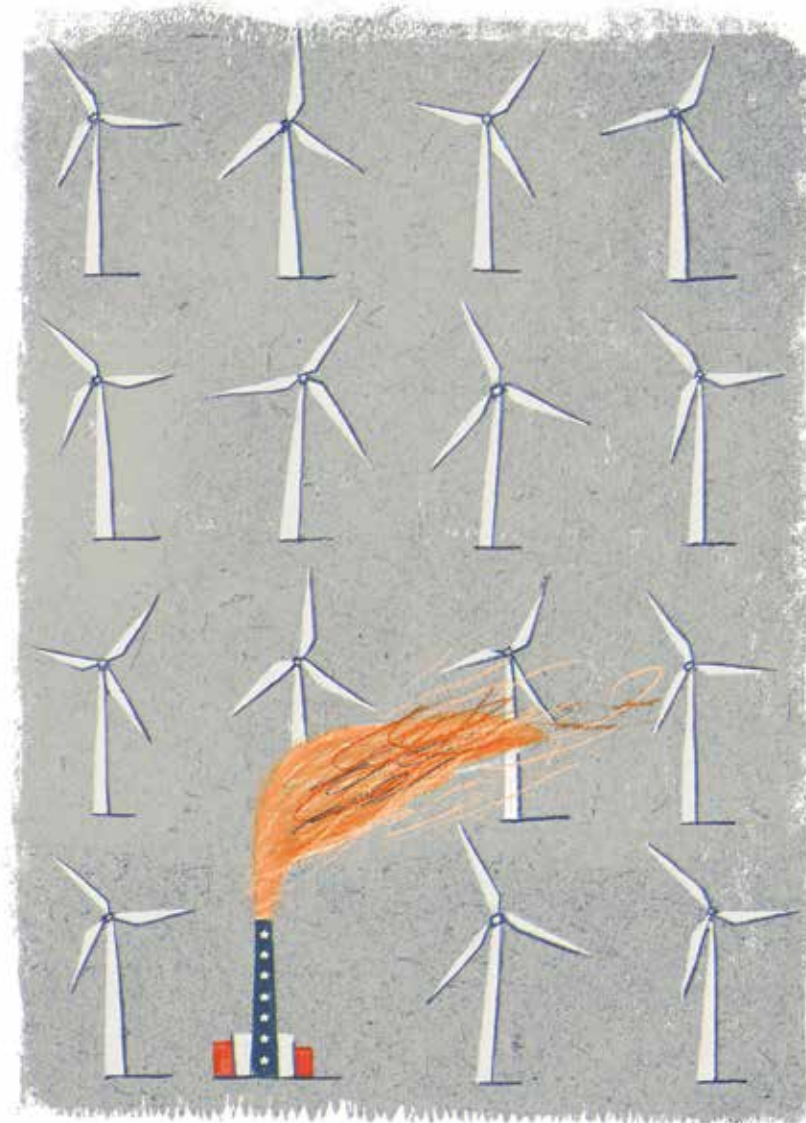
1. Can the USA legally withdraw from the Paris agreement?

The simple answer is yes. In his press statement, President Trump stated that the Paris accord was "non-binding". This is true. Under the terms of the agreement, parties are allowed to withdraw simply by submitting written notification. **BUT**, the USA cannot do this until 3 years after the agreement came into force, that is to say until 4th November 2019. What is more, once written notification has been received, it would be a full year until the withdrawal takes effect,

taking the date to 4th November 2020. That is the day after the next US presidential election, and many believe that President Trump is unlikely to serve out his full term. What is more, countries can re-join the Paris treaty at any point. So, the next few years will be very interesting.

In the mean-time, the United States must abide by the terms

of the treaty. This *does* mean that they must set nationally defined emission reduction targets, pursue measures to achieve these targets and report regularly on their progress. This does *not* mean that they must actually reduce their emissions, and there is no penalty for not meeting their targets. Is the incentive to set and pursue the ambitious targets needed to slow the pace of temperature rise,



Prabha Malliya

undermined by a stated intention of leaving the treaty. Surely the answer is yes.

2. Are there any sanctions or punishments which can be enforced, should the USA fail to abide by the terms of the treaty?

Yes. In an interview for the Financial Times³, Daniel Bodansky, a professor at Arizona State University and an expert on international climate law said "there aren't any specific penalties for violations, but other countries are allowed to take 'counter-measures' in response". These otherwise illegal "counter-measures" become legitimate tools once a treaty signatory fails to live up to its obligations. Would other countries be likely to challenge an economic behemoth like the USA by imposing such measures? Your guess is as good as mine, but it seems unlikely.

3. Is there anything 'we' can do?

I believe the answer to this is a resounding yes. Firstly, given that for the next four years the USA is legally committed to setting and working towards targets of emission reduction, we can lobby, campaign and watch like hawks to make sure they are doing this. To achieve the latter, through COP Watch here at CC, we will do our best to keep you up to speed with developments. The website

<http://climateactiontracker.org/> is another great resource, detailing the actions each country is taking towards meeting their targets. And for those ready to take action, there are several campaigns already running. The Guardian newspaper in the UK listed 10 which they felt were particularly effective (more information here: <https://www.theguardian.com/global-development-professionals-network/2013/nov/15/top-10-climate-change-campaigns>). A Google search of "climate change action campaigns" will bring up many other options depending on the type of campaign that appeals to you.

Secondly, given the likelihood that there will be a new President in position on the day the USA would actually leave the treaty, we must surely do all we can to convince that President to take the USA back in.

Conclusions

In many ways to backtrack from switching to an economy based on renewable energy sources seems like a negative economic step for the USA. Renewable energy sources are becoming cheaper by the day as the technologies for their production become more efficient and our ability to store energy for low-production periods improves. Meanwhile, fossil fuels are becoming more and more expensive. And of course ultimately, fossil fuels will run out,

meaning that in the long-term we have no choice but to switch to renewables. While other major global powers, including India, China and the EU Nations, forge ahead in renewable technologies, placing their economies on a strong footing for this inevitable low carbon future, the USA's actions seem to condemn them to a game of catch-up which must jeopardise their continued status as the World's primary economic power. Perhaps this will be enough to make President re-think his plans. If not, all is not lost. But we must act.

Finally, in other COP news, 15 more countries have ratified the Paris agreement since our last issue. This takes the total number of ratified signatories to 157, out of 195 countries which originally signed up. Well, swings and roundabouts I suppose.

Sources

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2. https://unfccc.int/files/meetings/paris_nov_2015/application/pdf/paris_agreement_english_.pdf
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Matthew Creasey is a Ph D Researcher at Centre for Ecology and Conservation, University of Exeter, UK, mjsc201@exeter.ac.uk.

Dissent

21st September 2017

I am on my way to Barcelona. If I squint I may just see the chimneys that signal the entrance to the city, but I know it's just my imagination – the city is still an hour away. The train from the provincial town of Blanes to the metropolis traces the Mediterranean coastline, a sleeper-and-iron transect that wanders along its beaches and coves. After every big storm, the sand from the beaches has to be cleared from the tracks. This railway line would violate every one of our coastal regulation zone (CRZ) rules in India. This is Spain. The track was constructed a long time ago. It probably violated many environmental guidelines back then. It was built anyway. The journey is undeniably lovely.

Barcelona is in ferment. The Catalans are demanding a referendum. They want nationhood. A separation from the idea of Spain and a recognition of their autonomous economy, culture, identity and history. Yesterday they took to the streets. The government in Madrid, in a ham-handed provocation, sent in the central police force to arrest and grill Catalan bureaucrats for colluding with the separatists. It didn't help that this was the same police force set up by the repressive dictatorship of Franco. The Catalans, in protest, took to the streets, pouring out of their houses carrying flags of an independent Catalonia, flowers

to hand to the police, pots and pans, righteous indignation. They encircled the administrative buildings with loud protests. The police could only leave when, past midnight, the masses granted them safe passage.

Dissent as democracy.

I live with a Catalan nationalist. She is a strong believer in the idea of a separate nation. I have watched how, over the last decade, her vague dissatisfaction has grown to a more focused indignation and a sharp anger at the increasingly authoritarian handling of the Catalan question. So yesterday, when she heard of the protests in the city, it was the most natural thing to leave work mid-sentence, jump into the car, and drive the 140 km to Barcelona to add her voice to the throng.

Standing with her in the crowded, angry square, watching a large banner welcoming us to the self-declared Republic of Catalonia being unfurled on a nearby building, I felt a sense of profound disconnection. How was I to relate to this? The Catalans have their political heroes, their ideological wise men and

women who show them the way. They may bicker over the little things, but they stand together on the important things. They seem to have a plan. And the Catalans believe them. When they call, the Catalans rise up to dissent. Change, they are assured, will come. A bright new future awaits, just there, past the next legal hurdle.

While one part of me envies this fervent energy, another - the resigned realist - cannot help smiling at the powerful belief the Catalans rest in their leaders. Our own experience in India tells how little our belief in politicians really brings. We are not ruled by a Franco - at least not yet. Still, we know better. Politicians of every stripe are an amoral, self-interested bunch of crooked power-brokers. The only thing that separates a good politician from a bad one is her ability to



Shreyas R Krishnan



Shreyas R. Krishnan

manipulate popular belief for as long as it takes to get what she wants. We know this in India. To find a politician that speaks with our voice is a vanishingly rare thing. And when he does, we have to look to him with growing suspicion. What's in it for him? When is he going to disappoint? We look at every call to dissent and we smile the smile of the failed romantic. Ah, yes. How wonderfully quaint to believe that dissent can bring change for the better.

Dissent as naiveté.

The coastline outside my train window is heavily modified. Harsh breakwaters - concrete and rocks - try vainly to protect small bits of coast from erosion. The beaches behind these breakwaters are artificial. They have to be replenished every few years with sand from the rivers, smoothed down each morning for a fresh batch of tourists. To the south, without having to squint, the three chimneys of Les Tres Xemeneies rise above the September haze that envelops the city. It is a defunct thermal power plant built right on the

beach, destroying vast acreage of the Bésos Delta when it was first constructed in 1970s. There were protests when it was first proposed. It will be an environmental disaster. It will be an architectural eyesore. It was built anyway. Coastal regulations were not so strict back then.

I think of our own coastal regulations in India. The year 1991 seems like a long time ago, but when plans for the coastal zone regulations were first being circulated, there was a genuine sense that this was

something different. It was not so much a legal notification as a vision statement. Of the special ecological status of the coast and islands. Of the unique traditions that linked coastal communities with their ecosystems. Of how vulnerable these narrow stretches are to rampant over-development, overuse, overpopulation. Climate change was not yet the buzz phrase back then, but here was a document that did everything you could expect from a government taking cognizance of how climate change was likely to impact the coast and islands. Sure, we bickered over the details. But here was something we felt we could be genuinely proud of. Something to believe in.

We know the reality. It is the reality of most environmental legislation today. There have been, to date, more than 20 modifications to the original notification, each a rationalization, a clarification, a dilution, a workaround. If current reports are right (and a recent right to information request confirms this), there are plans to make the notification a shadow of itself. The coast, in case you hadn't heard, is open for business. There are industrial and tourism opportunities everywhere, for the taking. This is not the 1990s. Or even the 2000s. The decades of dissent are done in India. So yes, there will be a few small protests, but they will be ignored, laughed at, labeled reactionary. Anti-national. There was a time when "environmental stories" bought eye-balls for our infotainment industry but between the

raucous politics of division and celebrations of India's neo-liberal dreams, they have other, more entertaining things to occupy themselves with now.

We have no environmental heroes in India anymore. Nobody who can get us out on the streets with our pots and pans. And while our government is not yet as blunt-headed as Madrid in dealing with dissent, the machinery of state is powerful enough. It is surprisingly easy to quiet the noisy NGO sector – show them up for the squabbling complainers that they are; magnify their differences so they make for easy pickings; remove them from all policy forums; weigh them down with bureaucratic filings; quietly threaten to revoke their legal legitimacy; squeeze their funding sources. Between fear, cynicism and plain tiredness, civil society voices are reducing to a whimper over government and big-business disdain for the environment.

Dissent is dead.

Barcelona's skyline is getting clearer on the horizon. Once reviled, Les Tres Xemeneies, now marks where the city begins. It is stripped bare of everything except its brick chimneys, but remains an architectural statement as iconic as Gaudi's unfinished cathedral. It stabs a coastline already much transformed. It tells its own powerful tale of dissent. Conceived in the 1970s, it faced huge opposition from environmental groups and the local government. The power

company that owned the property built it against a strong wave of local anger and ecological protests. Its three tall chimneys rose as a mutant three-fingered 'f*** you' to the environment, the coast, the local community. The plant polluted the nearby beaches and seas with black rain. Mistreated its workers. Saw more violent protests, this time from workers, in which police intervened. People died. And in time, like other grand projects of the time, it became unprofitable and faced demolition. Once loathed as an aesthetic disgrace blotting the city skyline, the citizens of Barcelona now rallied to save the structure as a symbol of cultural and environmental resistance. It lies bare now, its future uncertain. It may become a museum.

Dissent as art. Signifying all it fails to achieve.

Last night's crowds would have dispersed by now. They were up late, banging pots and pans on the streets and from their kitchen windows. Their dissent will continue. Will they get the change they want? And if it comes, will it be all they expect it to be?

Les Tres Xemeneies looms large.

This is my stop.

Rohan Arthur works as a scientist with the Oceans and Coasts programme of The Nature Conservation Foundation. He flits between India and Catalonia..

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