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Environment, Natural Resources and Sustainability

In this issue

RAJIV GANDHI
INSTITUTE FOR CONTEMPORARY STUDIES

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Editorial

The Rajiv Gandhi Institute for Contemporary Studies (RGICS) works on five themes:

1. Constitutional Values and Democratic Institutions
2. Growth with Employment
3. Governance and Development
4. Environment, Natural Resources and Sustainability
5. India's Place in the World.

This issue of Policy Watch deals with the theme Environment, Natural Resources and Sustainability.

The first article by Ridhi Shah from EdelGive Foundation, first published in https://idronline.org/ , describes the COP26 in Glasgow from Oct 31 to Nov 12, 2021 and explains how this year's discussions are extremely crucial for shaping the future of global climate action.

In the second article, first published in https://foundingfuel.com, November 09, 2021, senior thinker Mr. Arun Maira, highlights limitations of experts who rely on numbers and economists who rely on the notion of self-interest and invisible hand to offer solutions for problems such as climate change. He argues that social consensus can never be achieved by mathematical computations and digitally expressible choice. Before we jump to formulate global solutions, we must learn to listen deeply to people who seem to be not like us, and not as smart as us; and even to people we don't like, and who don't seem to like us. He highlights the need for cooperation rather than competition to deal with the complex issues we are facing.

The next article describes a study recently commissioned by the RGICS on localized ground water management solutions. This study is being carried out in partnership with NGOs and ground water experts in 10 different states. The article sets out the objectives, scope and methodology of the study which will go into the causes leading to the mismanagement of the ground water resources in India and identify successful localised examples of groundwater conservation.

The Government of India has proposed a series of amendments to the Forest Conservation Act, 1980 (FCA). Various organisations across the country have stated that these amendments will adversely affect India's commitment to conserve forest and provide livelihood to millions of its forest dwelling people. The fourth article is a summary of issues raised by various organizations on the proposed amendments to the FCA. This paper is compiled by Campaign for Survival and Dignity, Odisha.

The burning of crop residue in Punjab/Haryana each year causes the pollution levels to rise exponentially each winter, with PM (particulate matter) 2.5 and 10 levels reaching 'severe' categorization. The fifth article describes the results of a study on the issue by the India Paryavaran Sahayak (IPS) Foundation, on behalf of the Punjab State Farmers' and Farm Workers' Commission. The article is written by Mr. B.S. Sidhu, Commissioner Agriculture Punjab and Mr. Ritesh Bhatia, CEO, IPS Foundation.

Continuing with the theme of air pollution, at the end we carry an OpEd piece titled Climate change, competition, and the power sector which appeared in the Hindustan Times on 19 Sep 2021. It is by Prasanth Regy, Senior Consultant, Niti Aayog. Prasanth was earlier a Senior Fellow at the RGICS. In this article, drawing lessons from a power crisis in Texas earlier this year, he cautions the need to build climate shock resilient infrastructure and notes that choosing the appropriate level of resilience involves seeking a balance between these trade-offs.

We hope you enjoy reading these articles. We look forward to your feedback.

Vijay Mahajan, Director,
Rajiv Gandhi Institute for Contemporary Studies

All eyes are on COP 26: Here's what you need to know

Ridhi Shah, EdelGive Foundation[1]

The latest report by the Intergovernmental Panel on Climate Change (IPCC) revealed just how urgent the need is to address human-induced climate change. With many countries still in the midst of or just about recovering from COVID-19, there has been an additional strain on governments and organisations and their resources, which has disrupted crucial climate-based negotiations.

As everyone gears up for COP—one of the biggest conferences on climate change—here is some context on the conference and why this year's discussions are extremely crucial for shaping the future of global climate action.

What is COP?

COP or Conference of Parties is a critical gathering of various nation states to discuss their commitments to climate change and formulate a global response to the climate change emergency. All states that are parties to the United Nations Framework Convention on Climate Change (UNFCCC)—an environmental international treaty adopted by 197 countries around the world—are represented at the COP. This year the conference will be held in Glasgow from October 31–November 12, 2021.

COP 21 was a crucial one for climate action. Organised in 2015, it was where the landmark Paris Agreement was drawn up. As part of the agreement, the efforts to limit the temperature increase to 1.5 degrees Celsius, the impact of climate change on livelihoods, and the need to have measurable indicators for climate action were discussed in depth. The Paris Agreement also introduced nationally determined contributions (NDCs), which are long-term goals submitted by every member state outlining their efforts to reduce their carbon and greenhouse gas (GHG) emissions as well as other steps towards climate action. The NDCs are important in global climate change conversations as they allow member states to create their own strategies based on the budgets, knowledge, expertise, and resources available to them, in line with the long-term goals of the Paris Agreement.

1 https://idronline.org/article/environment/all-eyes-are-on-cop-26-heres-what-you-need-to-know/

With COP getting cancelled in 2020 due to the pandemic, the upcoming COP 26 becomes even more important as a platform to reanalyse whether the current NDCs of all member states are adequate to reduce carbon emissions and curtail global warming.

Photo Courtesy: https://citizensclimate.earth/2021/05/30/unfccc-virtual-meetings-can-set-stage-for-climate-action-upgrade-at-cop26/

Why is COP 26 important for India?

COP is a platform that creates space for various member states to share their knowledge, the lessons they've learnt, and the mistakes they've made while solving for climate change in their respective countries.

There is a lot of open-source information made available in terms of documents, research papers, experiments with renewable energy, or with regards to working with communities directly. And while India has a large population and a cultural diversity that can make it extremely complex to work with and implement certain solutions, COP provides an opportunity for us to interact with nations that may have similar dynamics.

In light of the latest IPCC report and the eye-opening statistics it revealed, COP 26 becomes an important forum that will pave the way for India's climate action in the coming years.

Here are some areas of concern for India:

1. Climate finance

   The term climate finance refers to the financial resources (local, national, or transnational) spent towards supporting mitigation and adaptation strategies to tackle current and future climate change impacts. According to the Copenhagen Accord, developed countries were committed to mobilising funds (at least USD 100 billion per year by 2020) to help developing countries mitigate climate change. In this regard, one of the major focus areas

for India at this year's COP will be climate finance. At the Ministerial Plenary of Pre-COP 26, India's union environment minister reiterated the importance of climate finance for developing countries such as India to meet goals in line with the Paris Agreement. However, India claims that it is yet to receive any of the funds that were promised.

2. Loss and damage

   Another important discussion to be had during COP 26 is that of loss and damage, especially in the context of developing and poorer member states. Regions across the globe have already been facing the devastating impact of climate change and rapidly increasing temperatures, largely due to emissions by developed countries. Many of India's most marginalised communities (such as small farmers) are finding it harder to cope with the damage caused by severe changes in weather patterns. In 2020 alone, India suffered its worst locust attack in decades, three cyclones, a nationwide heatwave, and severe flooding. And while the Paris Agreement makes provisions for loss and damage for poorer or developing countries like India in terms of financial assistance by developed countries, the 'how' is still unclear.

3. Carbon credits

   Carbon trading and markets, established under the Kyoto Protocol in 1997 as a measure to reduce carbon emissions, will also be up for discussion at COP 26. Simply put, carbon trading refers to 'the process of buying and selling permits that allow the permit holder to emit carbon'. Under this process, certain permitters can also offset their carbon credits, that is, they can pay for someone else's permit, thereby exceeding their emissions capacity, and continue to emit carbon without investing in low-carbon technology. This is negatively impacting developing countries, as richer countries purchase carbon credits for developing or poorer nations without keeping their carbon emissions in check.

4. An intersectional analysis of climate change

   As loss and damage due to climate change become more apparent across the world, COP 26 will provide a platform to discuss the impact of climate change on different individuals, groups, and communities. Anecdotal evidence in India shows that women might be more vulnerable to climate change than men. For instance, as water sources dry up, women in rural India might have to travel further to collect water on a daily basis. This impacts women's health and safety, among other things. Changing weather patterns directly impact land use practices, which can be critical for a country like India with a large agricultural economy. Therefore, it is important for member states and India especially to create more dialogue on an intersectional analysis of climate change, and perhaps look at a portion of funds set aside for thematic areas such as gender, livelihoods, and health to further aid climate action.

How should civil society organisations and funders be thinking about climate change?

At EdelGive, we began thinking about climate change and how it intersected with the thematic areas we focused on (such as urban skilling and employment) in 2015, when the Marathwada drought struck Maharashtra.

At the time, the climate conversation in philanthropy circles in India was still nascent. People were looking at providing relief, giving to rescue efforts, and meeting immediate needs—all of which were, and continue to be, very important. But during that time we began to realise that we must shift our focus to take climate factors into account. And so, in a year, we moved from looking singularly at urban skilling to building the resilience of communities around their own livelihoods.

Today, with the launch of the GROW Fund, we are taking that initial understanding further. Over the next two years we want to work with and strengthen 100 grassroots nonprofits across the country. We believe that doing so is integral to building resilience for the most vulnerable communities, and that this community resilience is integral to combatting the effects of climate change. (In fact, one of the goals of COP 26 is 'adapting to protect communities and habitats'.)

Based on our work so far, here are some tips for civil society organisations and funders looking to expand their understanding of, and work in, climate action:

1. Spend time familiarising yourself with climate vocabulary

   Or, if you are already climate savvy, you can act as a bridge between research institutions, think tanks, and communities on the ground facing the real-time impact of climate change. Encouraging active dialogue around climate change, in language that is easy to follow, can help increase the scope of climate action.

2. Bring a climate lens to your programmes

   A majority of nonprofits in India work in the spaces of education, women empowerment, health, and livelihoods. There is a huge interrelation between all these causes and climate change. For example, India's economy is dependent on agriculture, which is climate sensitive. Therefore, any changes in rain and temperatures will directly impact land use practices, livelihoods, food security, health, and more. It becomes essential then for nonprofits and their donors to adopt a climate lens, so that their interventions are intersectional and able to adapt to changing realities on the ground.

3. Take indigenous wisdom into account when planning climate interventions

   From deserts and mountainous regions to flatlands and tropical regions, India is geographically extremely diverse. Therefore, it is impossible for climate change solutions to take a one-size-fits-all approach. To create more sustainable and context-specific solutions, climate change measures must incorporate local or indigenous wisdom. This is where civil society organisations (CSOs) can step in. In partnership with the government, they can map indigenous solutions to climate effects, design and implement localised solutions, and create a more decentralised approach to tackling climate change.

4. Support climate initiatives in urban areas

   While understanding the effects of climate change on rural communities and building their resilience to the same is integral, we also need to be monitoring the consumptive lifestyles of the urban elite in India. Urban cities are a cause for, and a solution to, the climate crisis.

The current production and consumption patterns of an urban lifestyle have caused a waste crisis in the major urban cities of India, thereby contributing to the climate crisis further. Urban India generates 62 million tonnes of waste annually, and it has been predicted that this will reach 165 million tonnes by 2030. There is an urgent need for a change in this urban lifestyle—measures for segregation of waste, recycling, and stopping the use of single-use plastic straws, bottles, containers, etc.—to reduce the impact of the waste crisis.

5. Build an appetite for funding programmatic expenses

   Support from local funders, smaller philanthropies, and family endowments within the country will become absolutely critical for climate action. As climate impact can be intangible and often take place over the course of many years, funders will need to be more open to supporting its monitoring, evaluation, and mapping.

The Games we Play with Each Other

Arun Maira

Solutions for problems such as climate change are unlikely to come from experts who rely on numbers, and from economists who rely on self-interest and the invisible hand for progress. This is part of a zero sum, competitive, narrative. But nature is complex and insists on cooperation

The urgency to find solutions for the climate crisis, which is threatening the existence of the human species on the planet, has put the discipline of economics in the dock. Pursuit of relentless economic growth, which economists seem to imply should be the driver of governments' policies, is now suspected to be the culprit. They did not seem to have any other prescription for the improvement of human well-being.

Debates are stirring among economists themselves to change their theories and to improve economists' toolkits. The hoary maxims of rational self-interest as the sole motivation of individuals' and enterprises' decisions, and "the invisible hand" as the mechanism of producing social welfare, are being questioned. Concern for others and for Nature, and the design of institutions for enabling sustainable and inclusive progress, not just more GDP, is compelling economists to go back to the drawing board.

Economists are unlikely to find out of the box solutions if they keep debating among themselves, because they are all conditioned to think about the essentials of economics' methods in the same way. Indeed, it is their belief in the power of their logical and quantitative methods that makes them believe that economics is superior to other social sciences such as anthropology, for example, which relies on stories and historical narratives to explain what matters to people and the progress in their lives.

Economists have seen competition among humans, among business ventures, and among nations too, as the primal driving force for innovation and progress. The invisible hand has not worked equitably. Climate change requires new solutions, based on conscious cooperation among nations and citizens and with Nature, for the sake of the survival of all.

The fundamental questions that all scientists, and economists, must urgently return to are:

- How do we know what we really know?
- What are the meanings of the numbers in our equations?
- What is the nature of games we play in real life?

What Cannot be Counted

The power of information technology to read, manipulate, and store data in digital form has expanded unimaginably in the last twenty years. Digital devices communicating directly with each other are making human intervention unnecessary and human beings even irrelevant. Big data analytics is the new game of power and progress.

The Prisoner's Dilemma is a basic game in the science of game theory. It examines the question of whether cheating or cooperating with another is a more gainful strategy. Kaushik Basu has introduced a variant of this game, Greta's Dilemma, to explain the conundrum in demanding sacrifices in the present to save the planet for future generations. Applying the principles of game theory, it seems the future would be worse if leaders were to accept Greta's demands.

The problem is that it is impossible to get agreement on what the objective of any broad policy should be. When there are diverse interests, whose concerns should matter most? Kenneth Arrow (who won the Nobel Prize in economics in 1972) propounded the Impossibility Theorem. He proved, mathematically, that when voters have three or more distinct alternatives (options), no ranked voting electoral system can convert the ranked preferences of individuals into a community-wide agreement. The Arrow Impossibility Theorem is a fundamental dilemma in social choice theory, a discipline within economics in which Nobel Laureates Douglass North and Amartya Sen worked extensively too.

The Impossibility Theorem proves there is no voting method, in which voters by merely expressing their votes as yay or nay can produce a unanimous outcome, no matter how

many rounds of votes there are. The mathematical problem here is that individual voters' preferences cannot be sliced and diced; nor can the choice before them be made too simply as 'this or that' to enable easy voting and counting (as was done for Brexit for example.) Human beings' preferences are formed by combinations of many factors in their histories and in their present circumstances; also, by what they value most, which may not be the same as other citizens' values.

Choices must be framed clearly for digital voting. Therefore, deliberations among citizens who have diverse views are essential before votes are called. The Brexit vote, though close, was quickly counted. But the dispute within Britain continues about what all citizens really want.

The Prisoner's Dilemma is a simple game, often referred to by game theorists. It pits two players against each other. The players could be corporations or nations, but it is always one against another. The players are stripped of their histories, their values, and their qualities. They are given a simple, digital identity instead for the convenience of the game. When there are millions playing simultaneously, they are aggregated among themselves—those who "think like Greta" and those who do not—so that two "strategies" can be pitted against each other to play the game and determine which is a better strategy. The over-simplification of their identities and preferences, for the sake of playing a mathematical game, can make whatever theories are derived from it wrong in real life.

What Must Count

In a diverse society, people speak in many languages. In an economy, they adopt money as their common language. While this enables efficiency in transactions, it can strip out what is human among the transactors. Digital platforms for financial transactions reduce the costs and increase the efficiencies of transactions. The platforms are not concerned with the values that the parties are exchanging among themselves.

The value of money is precise, whereas the meanings of justice and the values of happiness cannot be expressed digitally. When people speak to demand justice or demand more happiness, what they want is not measurable in monetary terms. Therefore, it is confusing for economists to listen to what they are saying, as Milton Friedman, the author of the theory that "the business of business must be only business", had complained according to his contemporary, Albert O. Hirschman, an eminent political scientist.

Friedman had expressed difficulty in accepting the notion that people should desire to speak their views to make them prevail. He described people's desires to be heard as a resort to 'cumbersome political channels'. He would much rather they resorted to 'efficient market mechanisms' and used their money to make their opinions known. In markets, consumers have a choice to buy or not buy a product. Consumers can make themselves heard by simply walking out. "Exit is the sort of mechanism economics thrives on. It is neat—either one exits, or one does not; it is impersonal—any face-to-face confrontation between customer and firm with its imponderable and unpredictable elements is avoided," Hirschman explained.

"Put your money where your mouth is", is the way in a market economy. And "money must be heard", is morally right too for otherwise the economy would not work. Thus, money speaks loudly to shape economic policies even in electoral democracies. People who have little money, or no money, count less in businesses and political lobbies.

Friedman's Dilemma is a dilemma of measurement that pervades economics. Marianna Mazucatto explains, in The Value of Everything: Making and Taking in the Global Economy (2017), how the concept of 'value' has been corrupted in the financialized world where 'valuations' in money terms matter more that 'values'. The philosopher Michael Sandel goes further. In What Money Can't Buy: The Moral Limits of Markets (2012), he explains how societies can be corrupted when human values are replaced by money values.

I seem to be venturing into politics myself! Let me return to economic games, dispassionate mathematics, and computable economic models, the subject of this essay.

Godel's Incompleteness Theorem

Kurt Godel, winner of the Albert Einstein Award in 1951, is considered one of the most significant logicians in history (sometimes ranked alongside Aristotle). He brought three disciplines together: the theory of axiomatic reasoning, the study of mechanical computation, and the psychology of intelligence. Godel's Incompleteness Theorem (explained in his paper "On Formally Undecidable Propositions of Principia Mathematica and Related Systems I" in 1939) is an even more formidable theorem than Arrow's Impossibility Theorem. Whereas Arrow demonstrated that a single, universally satisfying, outcome is not possible to achieve mathematically while making social choices, Godel showed that no mathematical system can use its own logic to prove its own accuracy and universal validity. Therefore, the results of economists' experimental games cannot prove how the world outside their games actually works.

Every mathematical system is founded on a few axioms, along with some acceptable rules of computation. Axioms are statements or propositions which are regarded as being established, accepted, or self-evidently true. Godel proved that, in their attempt to achieve internal consistency, mathematical systems can become disconnected from external reality and externally inconsistent. They become inaccurate abstractions able to explain only some parts of complex reality, not the whole. Thus, they are always inherently 'incomplete'.

Euclid's geometry, which for two thousand years had seemed eternally valid, was founded on elementary notions of what a point in space is, and what a straight line looks like. In the twentieth century physicists found Euclidean geometry inadequate for explaining micro-level phenomena in physics, and even for explaining inter-stellar gravity. New concepts of multi-dimensional space and flexible time were required as axioms of new mathematical systems—even though these axioms defied common sense!

Godel did not seek to find the truth. He only showed why mathematics cannot prove what is true. His theorem of 'incompleteness' is a theorem of mathematical 'unprovability'. Readers interested in understanding Godel's proof, and its implications for the development of

artificial intelligence systems would enjoy reading computer and cognition scientist Douglas Hofstadter's Pulitzer Prize winning book (1989), Godel, Escher, Bach: The Eternal Golden Braid. He explains the complications in extracting information from data and meaning from information. He shows that the axioms (or hypotheses) on which scientific systems are founded always come from outside the system, as intuitions. They are an 'induction' from outside and cannot be 'deduced' from within the system itself. Nevertheless, for the equations in the mathematical system to consistently compute, they must be considered valid even when they challenge common sense.

Hofstadter uses examples from music (Bach), and art (Escher), as well as Lewis Carrol's style of amusing conversations on profound matters between peculiar characters, such as the Walrus and the Carpenter. Though more famous for Alice in Wonderland and other books he wrote for children, Lewis Carrol was a logician and mathematician. He had borrowed the characters, Achilles, and the Tortoise, from Zeno of Elea, a 5th century BCE Greek philosopher known for many ingenious paradoxes.

Zeno is one of the earliest remembered philosophers in the West who highlighted problems in applying quantitative conceptions to physical bodies and to spatial expanses as ordinarily conceived. He anticipated 2,500 years ahead, the problems that the paradigm changing physicists—Max Plank, Nils Bohr, Werner Heisenberg, Albert Einstein, and others—encountered in the twentieth century: problems of space that seems to curve and time that seems to go backwards.

I am getting diverted again from Greta's Paradox and game theory. In fact, Zeno's most famous paradox was explained by him as a game—a physical race, as well as a mental game—between Achilles and the Tortoise.

Back to playing games

All games are constructed with rules the players must follow. The objective of playing a game is to win. Competition is a foundational principle for designing interesting games. Players must play to win, not to arrive at a draw—a consensus as it were. A game in which no one is expected to win because everyone must win would not be an exciting game to watch. Who would one bet on?

The world is a complex system operating according to its own rules which scientists are continuing to seek. Godel (and the paradigm changing physicists of the twentieth century too), had discovered the fundamental need for 'isomorphism' between knowledge systems and reality. The knowledge system must map reality accurately. Scientists' mathematical models run according to the rules of the game they lay down for them. Their mathematical games may be internally consistent, but they are not practically useful if their architecture does not map the real world.

Whereas physicists' ambitions are limited to explaining how systems of materials and physical energy work, economics is a social science which must encompass an understanding of how human beings feel and think. The axioms of economics must be isomorphic with social realities.

Economists' models seem to have drifted too far from social realities in their attempts to achieve the mathematical precision that physicists seem to get from their models. Rational self-interest became an axiom for economists' calculus since Adam Smith's time. That competition is essential for progress is another axiom in economics. In economists' games, the protagonists are assumed to be self-interested players and are assumed to be always seeking strategies to win. If the outcome turns out to be a win-win (or lose-lose) situation—a solution fair to both, it is arrived at only by default, and not as a deliberate strategy by either player.

All competitive games, like internally consistent mathematical systems, are 'closed' systems. The number of participants in the game is limited. The objectives of the participants are clear: they must play to win. The space in which the game is played is bounded: the board or the field. The rules (axioms) are prescribed a priori. Nevertheless, it does take great intelligence to win complex games, like chess or go (weiqi), even though they are well-bounded games.

When AI machines have beaten human masters in chess and go, it is taken as proof that computers have caught up with (or even exceeded) human intelligence. However, victory in these bounded games is not proof that artificial intelligence is of the same type as, and isomorphic with human intelligence. Human intelligence operates in unbounded systems. Human minds can reason inductively without much data, and they can come up with creative concepts 'out of the blue' as it were. AI machines have not developed such abilities so far, and their digital mathematical models may never be able to.

Real life games are played in 'open' systems. It is not clear what the objective of the game is: whether to compete for personal gain or to cooperate with others to achieve 'win-win' outcomes. The number of participants is unlimited. The rules of the game are not known a priori: they are discovered and made up as the game proceeds. The game evolves, and the participants adapt to the game as it evolves. They dance with the game. Their moves shape the form of the game, and the evolving rules of the game determine further possibilities for their moves. (They are redesigning the airplane in which they are flying while it is in the air and they in it).

The real game of life is a complex, evolving dance: not a dilemma on a chess board. The complex world of Nature (and human society in it) is not a digital machine. It is a learning, evolving, living system, composed of diverse forms of life, diverse species, diverse human cultures, and diverse human beings, all co-evolving. The quality of the world around them is shaped by their interactions—their competition as well as their cooperation. The quality of their life also depends on the health of the universe around them that has brought them forth.

We are only small parts of something much larger than us that surrounds us, that existed before us, and that sustains our lives. What are the bounds of human knowledge will always remain a mystery to human minds. Such profound, epistemic questions which have been sources of wonder for ages, are stirring up philosophers and scientists again.

The "Song of Creation" in the Rig Veda (circa 1500BC) asks:
Who really knows? Who will proclaim it?
Whence was it produced? Whence is this creation?
The gods came afterwards, with the creation of this universe.
Who knows whence it has arisen? Whence this creation has arisen
—perhaps it formed itself, or perhaps it did not
—the one who looks down on it, in the highest heaven, only he knows
—or perhaps he does not know."

Count Less; Listen More

Before economists began to apply their theories of rational self-interest and competition for progress, human beings had, for ages, been playing games of cooperation and compassion in real life. They had developed ways of sharing and sustaining their 'commons' and they had lived harmoniously with Nature. Their cultures, their faiths, and their ways of cooperation have been swept aside with the colonization of their lands and their minds by a supposedly superior, modern scientific civilization spreading since the seventeenth century from the European Enlightenment.

The time has come to return from systems of mathematics to ways of wisdom; to return to a world of more qualities and less quantities; and to a world of cooperation not competition.

Mathematised modern sciences and economics have arrived in a cul-de-sac. They must now go back to reality; begin with new axioms; and apply new methods of inquiry to develop new strategies for human beings to cooperate with each other and to cooperate with Nature, rather than trying to control it.

We must listen to each other and learn from each other to save the world for everyone. We must understand others' aspirations and others' fears. We may never arrive at an unanimity of outlook on everything: and perhaps should not because then there would be nothing more to learn. It would be the end of evolution and life. However, we must strive for a workable consensus very soon, which means an agreement about the contours of a solution in which no one is harmed for the sake of gain for others, now or in the future.

This is Greta's Dilemma, to resolve which we must get out of the framework of the Prisoner's Dilemma.

Social consensus can never be achieved by mathematical computations and digitally expressible choices as Arrow's Impossibility Theorem proved. Before we jump to formulate global solutions and to calculate gains and losses, we must learn to listen deeply to people who seem to be not like us, and not as smart as us; and even to people we don't like, and who don't seem to like us.

(Courtesy: https://foundingfuel.com, November 09, 2021)

Localized Ground Water Management Solutions and Their Regulatory Significance

RGICS Study Group on Groundwater Policy

Introduction

Ground water extraction in India is increasing alarmingly and it has affected both the quality and quantity of the ground water. The unsustainable extraction of ground water has further adversely affected other natural wealth and biodiversity. The review of literature on this subject reveals following major issues pertinent to unsustainable use of ground water in India.

1- **Un-regulated operation** of more than 30 million groundwater structures across the country.

2- Activities/programs related to aquifer recharge and groundwater extractions are not **integrated**.

3- **Lack of data and knowledge** on hydrology and aquifer systems both at the level of policy makers and the end user.

4- Absence of knowledge, capacity and resources at the level of farmers to help them make the **right agricultural decisions and choices**.

5- **Disconnect** between hydrological/hydro geological knowledge and social/economic/ cultural requirements and practices.

There have been some attempts in various states commissioned by nongovernmental organizations to empower farmers with knowledge and capacity to help them to make the right agricultural decisions and choices. Many of these serious attempts helped in yielding good results as well. On the other hand there are numerous examples where projects related to artificial recharge were carried out successfully both by the government and non-government agencies. Some states also tried to regulate groundwater structures. All these

actions by different organizations generated huge knowledge and experiences to vet success and failure of each type of program. These small scale and localized solutions for ground water management are effective in terms of striking a balance between water supply and demand. Learning from these models can help improving ground water regulations in different states.

Therefore, the Rajiv Gandhi Institute for Contemporary Studies (RGICS) has commissioned a multi state research project to assess localized solutions for management of groundwater resources in different parts of the country to draw policy lessons for state level regulations. This project is being carried out in partnership with NGOs and Ground Water experts in Gujarat, Rajasthan, Punjab, Uttar Pradesh, Madhya Pradesh, Assam, West Bengal, Telangana, Maharashtra and Tamil Nadu.

The Ground Water Situation

Over the last few decades our dependence on ground water has increased tremendously. It has become a major source of water for domestic and agricultural use in India. According to an estimate the ground water resource meets 80% of our water demand. Agriculture is a major consumer of the ground water; it supplies nearly 60% of water demand of the agriculture sector. Worryingly, since the 1990s the area under canal and tank irrigation has observed absolute decrease in India, whereas, ground water fed agricultural area has increased in these years. The convenience and efficient last mile connectivity of ground water resources

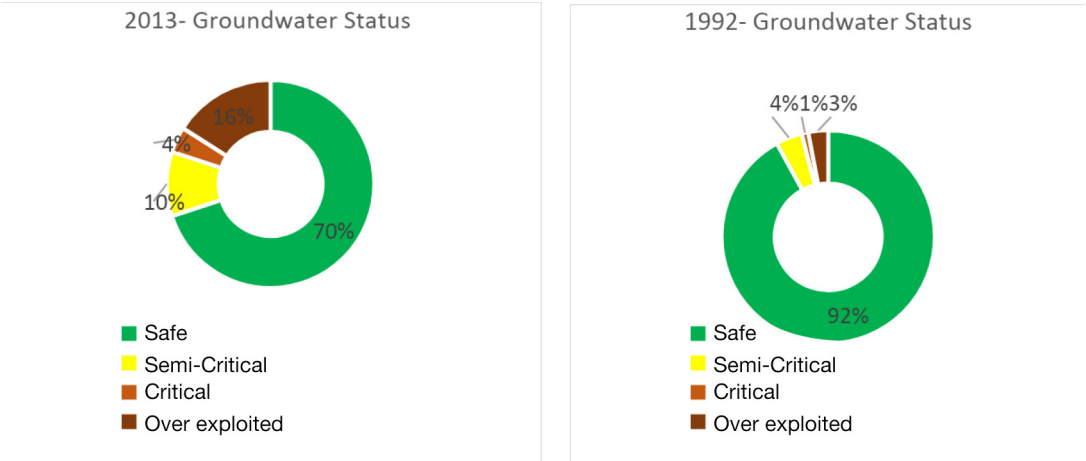
encouraged many farmers in this country to switch from canal/tank irrigation to the tube well/bore well.

A committee constituted by the government of India to review water governance in the country led by DrMihir Shah in his report observed that the public finance on water resources after independence largely focused on surface water[1]. Huge amount was invested on creating surface water infrastructure. The ground water resource remains neglected despite it replacing surface water from agriculture to domestic use in the last some decades. Individuals invested hugely in ground water infrastructure especially after the green revolution as it was easier and efficient in terms of available for the end use. The technological advancement and availability & affordability of power also helped individual investors (largely farmers) to create groundwater structures. Currently there are around 30 million groundwater structures in this country.

For the purpose of ground water extraction, enough knowledge and data is available. The problem is with lack of data on aquifer management. Being a large country, the geological and hydrological characteristics of the landmass varies from region to region. It further creates complexity to understand sub-surface characteristics pertinent to water seepage, storage and water movement. The CGWB has categorized 14 different aquifer settings in India. Major aquifers include Alluvial, Laterite, Sand stone, shale aquifer, Lime stone aquifer, Basalt aquifers and Crystalline aquifers. According to a classification of geohydrologist Dr. Kulkarni, Crystalline and Alluvial aquifers comprise 59% of the total aquifer area in the country. The mountain and volcanic system of aquifers accounts for 16% of the total area each. These complex aquifer systems require detailed mapping and study for better management of ground water.

The estimated total replenishable ground water in India is estimated at 433 BCM. The dependency on ground water in India has sharply increased since the 1980s. Currently more than 85 per cent of India's rural domestic water requirements and 50 per cent of its urban water requirements are being met from ground water resources. However, in many parts of the country the excessive extraction of groundwater created an aquifer recharge and extraction imbalance.

Chart-1: Percentage of units under safe, semi critical, critical overexploited categories on the basis of groundwater availability



(Source: CGWB report, Down to Earth)

1 https://www.indiawaterportal.org/sites/default/files/iwp2/report_on_restructuring_cwc_cgwb.pdf

The excessive extraction of groundwater in the last few decades has adversely affected the quality and quantity of the water resource. The overall stage of ground water extraction in the country wassuch that only 70% area fell in the safe category in 2013 and this number is now down to 63%. However, in the states like Delhi, Haryana, Punjab and Rajasthan the ground water development is more than 100%. It means these states have been using more water than available for extraction. According to the statistics published by CGWB in 2017 out of 6881 units assessed for ground water development across the country 972 were semi critical, 313 were critical, 1186 were over exploited and 100 units were saline[2].

The Problem

The increasing unsustainable extraction of groundwater is a serious issue that has now turned into a water crisis in many parts of the country. In the states like Punjab, Rajasthan, Haryana, Delhi, Madhya Pradesh, parts of Uttar Pradesh and Tamil Nadu have started withdrawing more water from sub surface than available for usage. This gap in demand and supply is continuously increasing as there is no aquifer management system in the place. The numbers of critical and over exploited units are on rise. This invited crisis due to mismanagement of natural wealth has serious social, economic and ecological consequences. There are many reasons behind this problem and these problems have been discussed a number of times.

Ground water extraction is largely unregulated. The only law that loosely governs this precious resource in India is the Indian Easement Act, 1882. This law gives all rights to land owners to extract the ground water. In other words it excludes land less people from access and use of groundwater. This law does not control or regulate water extraction and its usage by the land owner. To strengthen the regulatory mechanisms, the central government has so far issued four versions of model law to be adopted by state governments. The first model bill was released in 1992 and the latest bill was released in 2017. Yet not all states have converted the model Bill into state legislation. Andhra Pradesh, Assam, Goa, Bihar, Delhi, Himachal Pradesh, Jammu and Kashmir, Karnataka, Kerala, Lakshadweep, Puducherry and West Bengal have adopted the older version of model bill, but in most cases the attempt is half hearted[3]. Moreover experts believe that the model Bill must also move from command and control mode to participatory mode to ensure full participation of people.

The unavailability of data and knowledge on aquifer systems is another big problem in developing better management plans for the ground water. The CGWB collects data from selected wells four times a year to monitor ground water development. The sample size for this yearly exercise is so low that nothing can be argued conclusively based on collected information. There is a long pending demand of mapping aquifers in this country for better management plan. The CGWB has been attempting to map aquifers for all districts in the country. This data and mapping of aquifers would definitely improve our ability to manage groundwater better.

The absence of an integrated approach of ground water recharge and extraction is completely missing in India. There have been some attempts through government and non-government agencies to integrate both of these aspects, but this idea is still not part of national or state

2 http://cgwb.gov.in/GW-Assessment/GWRA-2017-National-Compilation.pdf
3 https://scroll.in/article/929433/as-the-water-crisis-deepens-can-india-afford-to-leave-groundwater-unregulated

level management plans. The absence of regulations and public finance for the management of ground water further discourages any national or state level plans for ground water resource management.

In the past the CGWB attempted to design a national level master plan for artificial recharge of aquifers in 2002 and 2013. The board has now revised this master plan in 2021. According to this master plan, nearly 1.41 crore artificial recharge structures are needed across the country. The type of structures recommended for states and districts varies depending on their geological and hydrological features. The plan is expected to be financed by ongoing projects such as MGNREGA and Watershed Management. The implementation of the master plans requires investment of Rs. 1.33 lakh crore[4].

Involvement of people in planning and execution of activities related to artificial recharge and ground water extraction has not been seriously promoted at the policy level. However, we have numerous small examples across the country to show that if people are involved aquifers can be managed sustainably and benefits can be shared equitably.

To study this issue in greater detail and generating field based insights. The RGICS constituted a Study Group under the convenorship of Director, RGICS, Mr Vijay Mahajan and Mr Jeet Singh, Fellow RGICS and members who are groundwater practitioners and researchers. They commenced this study in the month of October 2021 and the field work will be completed by February and the final report is expected to be ready by March 2022.

The Study

The study on assessment of localized solution of ground water management commissioned by the Rajiv Gandhi Institute for Contemporary Studies has following objectives.

- To develop an overview of the hydro-geological characterises of different states/ regions and the extent of ground water extraction.

4 http://cgwb.gov.in/Whatisnew/2021-06-30-Final-Approved%20Master%20Plan%202020-00002.pdf

- To document and assess the regulatory framework in different states for the management of ground water resources
- To assess the ability of localized solutions for management of ground water resources to strike a balance between demand and supply of groundwater.
- To draw policy lessons from successful localized solutions for ground water resource management

This study involves both desk analysis and field work. The overview of hydrology and geo-hydrology and assessment of state level regulatory framework will be largely done by desk research. However, the project team will meet and consult with experts and stakeholders to understand and decipher the complexity of the issue.

For the purpose of assessing localized ground water management solutions, field work will be carried out in two or three hydro-geological regions in a state. Minimum two localized solutions from each region will be assessed by meeting villagers, institutions and analyzing their documents.

Amendments to the Forest (Conservation) Act, 1980: Forest conservation and rural livelihood Implications

Campaign for Survival and Dignity, Odisha Chapter

The government of India has proposed a series of amendments to the Forest (Conservation) Act, 1980 (FCA). The Ministry of Environment, Forest and Climate Change (MoEFCC) had posted a consultation paper on proposed amendments to the Act on their website for public comments and suggestions in October 2021. Various organisations across the country observed that these amendments will adversely affect India's commitment to conserve forest and provide sustainable livelihood to millions of its forest dwelling tribes and communities. The Campaign for Survival and Dignity (CSD), a national level platform for adivasis and forest dwellers' organisations from 18 states, has opposed proposed amendments to the Act. The objections and suggestions submitted by the CSD to the MoEFCC are described in this paper.

Limiting scope the FCA:

The point-1 of the consultation paper of MoEFCC refer to ambiguity created by the widening of the definition of forest due to the Judgment of the Supreme Court on 12.12.1996 in the Writ Petition (Civil) No. 202/1995 in the matter of T.N. Godavarman Thirumulpad versus Union of India and Others. With this, FCA became applicable to lands outside the notified 'forests'. This has resulted in resentment and resistance particularly from private individuals and organisations as such lands are restricted from non-forestry activities. Therefore it is necessary to 'define the scope of the application of the FCA in an objective manner'.

Objection: The overall intent of the proposal is to drastically limit the scope of application of FCA and FRA by excluding vast forest lands outside notified forests, a range of non-forest activities and certain forest lands within notified forests as well in a very ambiguous and

arbitrary manner. This is to free these lands from forest clearance for change of land use to non-forestry activities by state agencies and the private sector. This then adds to the already existing exemptions from both FCA and FRA, and many more from FRA and Gram Sabha consent in contravention of extant laws. Further,

(i) The legal reality is that FRA already defined 'forest land' to mean land of any description falling within any forest area including unclassified forests, undemarcated forests, existing or deemed forests, protected forests, reserved forests, sanctuaries and national parks. FRA already recognises and vested rights of Scheduled Tribes (STs) and Other Traditional Forest Dwellers (OTFDs) on all these forest categories and empowered the Gram Sabhas to determine their rights and to govern and manage the forests as Community Forest Resources (CFRs). FRA recognises existing activities to meet livelihood, social and cultural needs, and empowers Gram Sabhas for protection and conservation of wildlife and biodiversity. Moreover, these forest rights are already exempt from the application of FCA anyway. By drastically restricting the scope of FCA under the guise of freeing forest land and certain activities from the application of FCA and therefore the purview of FRA and Gram Sabha, MoEFCC hopes to take away the regulatory powers of the Gram Sabhas under FRA on the one hand and on the other to liberalise the use of forest lands within notified forests for non-forestry activities. In addition, forest lands outside notified forests are freed from FCA in order to liberate them from the vile clutches of FCA that causes people to keep forest lands free of any vegetation according to MoEFCC, when in fact this will primarily aid the rapid land use change to non-forestry activities free from the Gram Sabha oversight under FRA with regard to protection and conservation of ecology. The primary gainers are intended to be the private sector.

(ii) In addition, a large part of such lands fall within the Scheduled Area and therefore under the purview of the Gram Sabhas under the Provisions of the Panchayat (Extension to scheduled Areas) Act 1996 with regard to land and natural resources.

(iii) The subject of forests is now divided into forests other than forest rights and forest rights and allocated to MoEFCC and Ministry of Tribal Affairs (MoTA) respectively by the amendment to the Allocation of Business Rules 1960 .

Exempting Land Acquired Prior to 1980 from the Purview of the FCA:

The second amendment proposes to exempt lands acquired by agencies such as Railway, NHAI, PWD etc prior to 1980 which remained unused and had grown trees or forest thereby coming under the purview of FCA now, in order to allow such agencies to use the land for non-forestry purpose as project expansion or other purpose, without having to comply with the provision for getting clearance under FCA.

Objection: Land acquisitions by state agencies have often led to displacement with loss of land and livelihoods by the poor and marginalised communities. A large part of such acquired lands remain unused by the land holding agencies for years. Recognising this gross injustice,

the FRA requires under Section 4(8) that those who had their lands acquired by government agencies and displaced without land compensation where such lands have not been used for the purpose for which it was acquired within five years of the said acquisition, such lands are to be restored to the STs and OTFDs. The proposed amendment would negate the return of the unused land to the original right holder thus negating the provisions in laws that now require addressing this injustice. Instead, it would allow such agencies to continue to hold on to the unused land at will. Instead such lands are to be reverted back to the communities. Further,

(i) The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act 2013 (LARR) requires land acquired but remains unutilised for a period of five years from the date of taking over the possession, the same shall be returned to the original owner vide Section 101.

Exempting Deemed Forest Land from the Purview of FCA:

The third proposed amendment refers to the category of deemed forest which attracts the provisions of FCA and the need for finding land outside the govt forests to i) meet the target of one-third of land to be under forest cover as per the National Forest Policy 1952, ii) meet the target of creating carbon sink of additional 2.5 to 3.0 billion tons of CO2 equivalent by 2030, iii) to promote plantation of woodlot to reduce the flow from foreign exchange for import of wood and wood derivatives to the tune of approximately Rs 45 thousand crores. It proposes exemption of all such plantations in private and non-forest land from FCA.

Objection: Large scale monoculture and commercial plantation projects are implemented on lands used by farmers and Adivasi communities, and on common lands. This affects their rights and livelihoods and destroys the biodiversity as well. The central government and the

MoEFCC are pushing the states to identify and use all types of land (forest land in revenue records, non-forest land, common lands and private lands) to carry out extensive plantation under the Compensatory Afforestation projects and under the climate change actions for creating additional carbon sink. These plantation projects have been widely opposed by the Adivasis and forest dwelling communities as they affect their rights and livelihoods and destroy biodiversity by replacing multifunctional forests and vegetations with ecologically destructive monocultures. Further,

(i) These plantations have led to land grabbing and land alienation by agencies and are a den of corruption.

(ii) The central government programmes such as oil palm and biofuel plantations have raised similar concerns. The central government has also been promoting the private sector companies to implement large scale plantation projects. Exempting these from the purview of FCA allows government agencies and private sector to establish massive commercial and monoculture plantations making use of the government incentives / funding, to harvest them at will later and change the land use freely to non-forestry without Gram Sabha consent. This will lead to violation of rights of communities, destruction of forest and biodiversity and land grabbing.

Exempting Forest in Revenue Record from the Purview of FCA:

The fourth amendment to the FCA points to those lands which have been entered in both revenue and forest records creating misinterpretations and litigations. The amendment proposes to exclude such lands recorded as forest after 12.12.1996 in pursuant to the Supreme Court order from the purview of the FCA to encourage forestry activities (including agroforestry and other tree planting systems).

Objection: An estimated 40 million hectares of forest land are recorded in village revenue records of 1,77,000 villages in India. These revenue forests include nistar forest used by communities, community protected forests etc. FRA recognises rights of communities over all such forests and this includes 'rights in or over disputed lands' (Sec.3(1)(f)). These lands, wholly or partly, were recorded by the state forest department as forests in pursuant to the said Supreme Court order. FRA brings all such forests into the governance and control of Gram Sabhas. Therefore the proposal to exempt these lands in revenue records marked as forests by the forest department after 1996 from the purview of FCA is to allow change in land use at will and to take it out of the purview of the Gram Sabha which is a violation of FRA, the legal rights of STs and OTFDs and the authority of Gram Sabhas. This would generate widespread conflict pitting various state agencies against the Gram Sabhas and FRA right holders across the country.

Amendments Opposed to the Forest Rights Act, 2006:

Amendment no. 2, 5, 7, 9, 11 and 14 propose exemptions from FCA for use of forest land in case of i) land acquired by agencies such as Railway, NHAI, PWD etc prior to 1980 which remained unused and had grown trees or forest, ii) strip plantations, amenities, habitations

developed alongside roads and railway lines, iii) development of infrastructure along the international border areas for strategic and security projects of national importance, iv) non-forestry activities which are ancillary to conservation of forests and wildlife such as establishment of zoos, safaris, Forest Training etc, v) use of technologies such as Extended Reach Drilling (ERD) for exploration or extraction of oil and natural gas beneath the forest land, and iv) surveys and investigation activities in forest land.

Objection: All these proposed exemptions directly violate FRA. These are in continuation to the several other such exemptions that MoEFCC has illegally granted for making forest diversions easy for government and private agencies. MoEFCC illegally exempted compliance with FRA in forest diversions, for instance, in the case of i) linear projects, ii) mineral prospecting, iii) forest diversion in areas without "tribal populations", iv) grant of mining leases, v) creation of land banks, vi) while granting of "in principle" Stage I clearance, and vii) temporary use of forest. Further, While the earlier exemptions were in effect in violation of both FCA and FRA, the proposed exemptions under FCA would still be in violation of FRA.

(i) FRA establishes the rights and governance of communities and gram sabhas over all forest areas and requires the authorities to ensure compliance of FRA and the consent of Gram Sabhas before diverting forest land. The Supreme Court, in the Niyamgiri case, has also reiterated the legal requirement for ensuring compliance of FRA and consent of Gram Sabhas before diversion of forest land.

(ii) The MoTA has clarified to all State governments that the FRA applies to all forest land diversions 'without any exemptions' and that Gram Sabha consent is mandatory.

(iii) The exemptions proposed in violation of the Supreme Court judgments.

Protecting Forests in their Pristine Form:

The sixth amendment proposes to keep certain pristine forests intact for a specific period.

Objection: This is a half-hearted attempt to give the proposed amendment a conservation cloak while implicitly justifying destruction of forests through non-forestry activities in both notified forests and outside as well. In the past the proposal for creating 'go and no go areas' in the case of mining projects have been thwarted. Further,

(i) Creation of this so-called pristine forests is in no way different from the Protected Areas as National Parks, Wildlife Sanctuaries, Tiger Reserves etc under the Wildlife (Protection) Act 1972 (WLPA) all of which too are kept pristine until diverted under FCA. All that it attempts is to introduce another category of forests where rights can be prohibited;

(ii) FRA negates the colonial rights regulating and prohibiting regime in forests and Protected Areas fully not withstanding anything containd in the forest laws including WLPA and FCA. In fact, where FRA rights fall within these Protected Areas, the power to protect, conserve and manage forests, wildlife and biodiversity stands vested in the Gram Sabhas. The exemption proposed is a vile attempt to take back exclusive control of a part of the forests.

Dilution of FCA for Mining Leases:

The amendment no. 8 proposes to delete the Sub-Section 2(iii) of the Act dealing with mining leases and bring it under the rigour of the procedure for forest diversion under sub-section 2 (ii).

Objection: There are huge illegalities and irregularities in forest diversions for projects approved under both sections 2 (ii) and 2 (iii) of FCA. Most proposals for forest diversions under section (ii) are found to be in violation of compliance provisions under FCA for FRA. In most of the cases, the Gram Sabha consent is not taken after completing FRA implementation, nor consent taken as per the legal provisions; often documents are forged and false certifications by the authorities are used. Similar is the case with forest lease operations and extension of the leases which are carried out with more ease. Deleting Sec.2 (iii) and bringing lease under the purview of Sec. 2(ii) into a single procedure without any provision to incorporate FRA compliance into this section is but pretension of stricter regulation of forest diversion. Therefore, incorporation of FRA compliance into Section 2 of FCA is legally necessary for harmonising both FCA with FRA as the latter overrides in law.

Grievances of Individuals on the Forest Land:

The tenth amendment concerns certain grievances of the private individuals whose lands come within the State specific Private Forests Act and therefore coming within the purview of the meaning of 'forest' as per the 12.12.1996 Supreme Court order. It is proposed to allow such private land owners to use such land for construction of structures for bonafide

purposes including forest protection measures and residential unit up to an area of 250 sq mtr as a one-time relaxation. This must be seen along with the exemption from FCA extended to forest lands outside notified forests.

Objection: This, in effect, overrides the relevant State law. Since FRA applies to all forest lands, the governance jurisdiction of the Gram Sabha extends also over such private lands which fall within the territorial limits of the Gram Sabha. As of now, these state laws have not been amended to comply with FRA. The regulatory authority under these State laws continues to disregard FRA and function in violation of FRA. The proposed amendment without recognising the jurisdiction of Gram Sabhas where applicable and the provision for Gram Sabha consent for land use change including construction is yet again an attempt to thwart and subvert the legal authority of the Gram Sabhas.. While dismantling the present authoritarian FCA regulatory regime totally, it has to be replaced by a judicious democratic conservation regime over forest lands outside notified forests which already exist in the form of FRA. Gram Sabha approval for change of land use including for construction should be fundamental in order for the Gram Sabha to ensure that such activities do not pose a threat to conservation and protection of forests, wildlife and biodiversity.

Imposition of Compensatory Levies:

The 12th amendment to the FCA bars double imposition of compensatory levies where such levies are presumed to make good the ecosystem services after the land is used for non-forestry purposes.

Objection: Fundamentally imposing compensatory levies under the argument that these will make good the loss of ecosystem services has no basis in science. Further, the bar on double imposition of levies only makes it that much less expensive for the user agency. Absence of anything on increase of levy amount in addition contributes to favouring the user agency, whether public or private and ease of doing business.

Imprisonment and Penal Compensation:

The last amendment proposes simple imprisonment and penal compensation for violations in addition to what exists already under FCA.

Objection: Any violation of the provisions of FRA is an offence under Sec 7 of FRA for which the Gram Sabha is to issue a notice under Sec.8 of FRA to the Chief Secretary to initiate action against the violator. Such violations are also violations under SC and ST (Prevention of Atrocities) Act 1989 through an amendment in 2016. The violations of the provisions under FCA with regard to FRA compliance for forest diversion are also violations that falls within the ambit of the said Acts. The proposed amendment does not update the law by incorporating provisions to recognise such violations of FCA provisions with regard to FRA compliance as offences under FCA and recognising the authority of Gram Sabha as the statutory authority to initiate action in such instances under FCA is telling.

The public notice for comments to the so-called proposed amendment to FCA 1980 without the actual amendment strangely enough comes after the MoEFCC disowned its earlier attempt to amend IFA

1927 and subsequently floating a tender calling private law firms to bid for drafting a law to replace IFA 1927 itself. Instead of amending FCA to update the law to make it harmonious with FRA, the haste with which these amendments are proposed to override FRA and deregulate forest diversion even while an IFA 1927 replacement is already in the pipe line indicate haste. Why this haste to deregulate notified forests and exempt all forest lands outside notified forests from the application of FCA? Is this to pre-empt the IFA 1927 to limit its applicability and therefore divert maximum lands for non-forestry purposes thus taking it out of the purview of the proposed IFA 1927 replacement? No doubt this well recorded and recognised anachronistic and colonial law IFA 1927 should have been repealed long back with a forest governance law befitting a democratic nation. Such a new forest governance regime following and befitting the new legislative regimes that have already been effected by 73rd Constitution Amendment (now Part IX read with 11th Schedule of Constitution) 1992, PESA Act 1996, FRA 2006 and LARR Act 2013 should have been the way forward.

Overall, the proposal for FCA amendments,

- Intends to limit the application of both FCA and FRA by taking out large forest areas out of the purview of FCA to ensure diversion of forests for use by public and private sector and advance the agenda for 'ease of business'.
- Violates the FRA, PESA and constitutional provisions for the STs and other traditional forest dwellers.
- Violates the policy for pre-legislative consultation by not following the timeframe required for consultation and by releasing the proposal in only English and that too providing 14 items intended for amendment which are vague, unclear and in places self-contradictory, without spelling out the actual proposed amendment.
- The MoEFCC has not consulted MoTA which is entrusted with all matters related to forest rights as usual.
- Attempts to redefine forests to promote private plantations that can lead to massive deforestation and environmental degradation.
- The FC A 1980, enacted long before 73rd Amendment, PESA Act, FRA and LARR, is already overdue for updating to bring it in line with the new democratic regime which is required by law.
- Finally, all that this proposed amendment indicate is the persistence of MoEFCC under control and pressure from the colonial forest bureaucracy to retain the colonial authoritarian hold over forest resources, now to serve interest of businesses rather than the common good of the people.

In view of the above, the proposed amendments must be dropped by the MoEFCC. Instead, the ministry must begin exhibiting compliance with laws, particularly FRA and concede the authority of Gram Sabha in the decision making on forest protection, conservation and forest diversion.

Adoption of Crop Residue Management (CRM) Machinery in Punjab

Mr. B.S. Sidhu and Mr. Ritesh Bhatia[1]

The burning of crop residue in Punjab/Haryana each year causes the pollution levels to rise exponentially each winter, with PM (particulate matter) 2.5 and 10 levels reaching 'severe' categorization. According to the WHO, PM 2.5 levels should not exceed 25 micrograms per cubic meter over a 24-hour period and 10 micrograms per cubic meter on average over a year.

1 Mr. B.S. Sidhu is Commissioner, Agriculture, Punjab and Mr. Ritesh Bhatia is CEO, India Paryavaran Sahayak (IPS) Foundation. The IPS Foundation is a not-for-profit entity incorporated under Section 8 of the Companies Act. IPSF comprises promising, young, **environmentally conscious individuals** who come from varying business fields and have a shared vision of shouldering the responsibility as individuals and as an entity to protect and support all endeavours that are environmentally progressive. IPSF works closely with farmers to generate awareness around the ill effects of stubble burning, on available technologies to manage crop residue without burning, and prevailing government schemes. It educates and traina them on the use of these multiple technologies to improve the adoption of non-burn practices.

But in Delhi, PM 2.5 levels repeatedly surge to almost 1000 in the winter – a figure so high it's literally off the charts vis-a-vis several pollution monitoring devices. Further, though many think of Beijing as one of the world's most polluted cities, Delhi's PM 2.5 levels tend to be about three times the Beijing mean and 15 times the WHO guidelines. This article describes the results of a study on the issue by the India Paryavaran Sahayak (IPS) Foundation, on behalf of the Punjab State Farmers' and Farm Workers' Commission.

Rice-wheat (RW) is the primary cropping system of Punjab, covering about 30 lakh hectares during Kahrif season and 35 lakh hectares during Rabi season. The cropping system produces about 20 million tonnes of surplus residues i.e can not manage, of which rice alone contributes 80 percent. The disposal and utilisation of a huge amount of stubbles/straw is a challenge. The problem is magnified for paddy residue due to the short window period for sowing wheat after harvesting paddy.

Until a few years back, the non-availability of suitable machinery was a major constraint in the sowing of wheat in the combine harvested field paddy. With technological advancements during the last decade, options for both surface retention/ incorporation (in-situ) and out of the field (ex-situ) management of straw/stubbles are now available. Central and State Governments are actively working towards solving the problem ofcrop residue burning. Punjab Government has banned crop residue burning and initiated a financial assistance programme to promote crop residue management technologies.

For addressing air pollution and subsidising technological management options for in-situ management of crop residue, a Central Sector Scheme "Promotion of Agricultural Mechanization for in-situ management of cropresidue in the States of Punjab, Haryana, Uttar Pradesh and NCT of Delhi" was launched in the year 2018-19.

The Commission intended to study the farmers' perception about the scheme itself, understand the scheme's implementation in the State and identify the areas for improvement in the scheme.

India Paryavaran Sahayak (IPS) Foundation has been working with the farmers in the State on crop residue management for quite some time. Given their connection with farmers, Commission partnered with IPS Foundation to carry out the study with the following objectives:

a) Understanding the efficacy of the Crop Residue Management System (CRM) in Punjab,

b) Assess motivators to adoption, and

c) Understand stakeholders' views on gaps in the scheme and identify ways for improving its adoption.

The study strives to find drivers, triggers, and barriers for adopting modern technology to move away from the traditional method of stubble burning.

Sample Size

The study is based on primary data collected in the year 2020 from 1348 farmers, 58 CHCs, 50 Primary Agricultural Co-Operative Society, and 20 SMS Combine owners in 11 pre-selected districts of Punjab, covering 271 villages.

The districts for the sample were selected purposively based on a higher number of crop residue burning/fire incidents and area under non-basmati paddy varieties. The number of blocks and villages in each district were selected based on probability proportional to size (PPS) methodology. At a 95 percent confidence level and 6 percent confidence interval, the desired sample size is 255. The study covered 271 villages to have more diversity and representation.

The key findings of the study are as follows:

- The awareness of the scheme amongst individual farmers is universal, and almost everybody knows about the scheme. However, higher awareness is only the dimension that such scheme is being implemented. Nearly half of the farmers donot understand the CRM scheme and know only a few dimensions.
- The primary source of awareness about the CRM Scheme is the Department of Agriculture, KVKs and Panchayats.
- The reach of messages being delivered under the IEC component of the scheme is low. 42 percent of individual farmers have not been exposed to the messages on crop residue management. The strategy for conveying the message is not well defined. 10 different mediums have been used to convey messages, and the impact of a single medium cannot be gauged.
- Training and demonstration under the scheme lacking, which may have impacted the adoption rate. 23 percent of the farmers have attended the training. 45 percent are not aware of the training, and a high percentage does not feel the need for training.
- The participation in the scheme is higher for large operational landholding. The high price of the machines and not getting the desired machine are the primary reason for not participating in the scheme by the individual farmers.
- The satisfaction level among the beneficiaries of the scheme is low. 14 percent of the beneficiaries are satisfied with the scheme. High neutral responses to satisfaction indicate that the scheme has not percolated deep down where it counts. Machine price, high rentals, non-availability of the desired machinery, higher costs, and higher HP tractor requirements are the main reasons for dissatisfaction with the scheme. About 58 percent of CRM users are dissatisfied with the after-sale services of the machines.
- About 50 percent of the beneficiaries are not aware that they could purchase the machines on margin money. The expected delivery time of the machines is 9.5 days,

but it takes around a fortnight for delivery and installation of the machines. On average, the subsidy is credited to the beneficiary's bank account after 40-45 days of inspection.

- The machines purchased through CRM are majorly underutilised. Only 8 percent of the individual beneficiaries rent out the machines, and the average area covered by rented out machines is 31 acres for 2019. The awareness about the mobile applications for the hiring of the machines is relatively low. The average rental per acre during 2019 for supper seeder was Rs. 1876, happy seeder was Rs. 1552, mulcher was Rs. 1250, and bailer was Rs. 1040.
- Despite high awareness, the adoption of CRM technology is low (35 per cent). A large section of farmers is neutral towards the benefits of the scheme. Small farmers perceive that the scheme is to benefit only large farmers.
- Key barriers to adopting the CRM machines available under the scheme are high machine price/rental, higher HP tractor requirements, technical issues (cannot be used in unlevel filed, making soil harder, apprehension on yield).
- 13 percent of individual farmers are Lapsers, i.e., farmers who used non-burning practice in the first year but adopted residue burning the following year. The primary reasons for abandoning the technology are high rental & fuel cost, no access to a large tractor, immediate payment of rental, non-availability of the required machine (like happy seeder, rotavator), and waiting period for getting the machine.
- Although the use of SMS with combine harvester is compulsory, SMS was not used by 62 percent of farmers. The rate of adoption is less in all the districts. The general perception around SMS is it leads to increased cost, is not suitable for specific soil type and paddy variety (PUSA 44), and non-availability of good quality SMS (grain loss and poor shredding and spreading of stubble).
- The main source of capital for establishing CHC is the contribution by individual members. 26 percent of the CHC have availed of loan for the purchase of machinery from banks and other institutions.
- Half of the CHCs have received training, and the primary sources of training are the Department of Agriculture and KVKs. 31 percent of CHCs who have taken training found it satisfactory. For those who have not taken any training, the main reasons were; felt no need for training and no clarity/awareness on training.
- Half of the CHCs are not aware that they could purchase the machines on margin money. The inspection of machines was not done for 36 percent of the CHCs before crediting the subsidy to them. For those where the inspection was done, the time taken after inspection for crediting the subsidy was 40-45 days.
- For more than half of the CHCs, the machines were delivered close to the harvesting season, due to which they had less time for training and had a high idle time for machines.

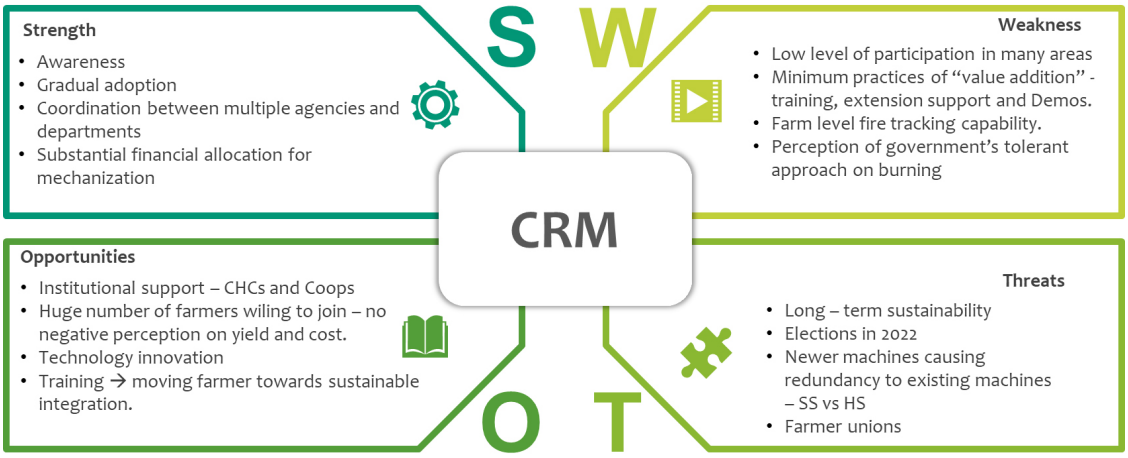
- A single CHC covers around 3 villages and has, on average, 3 different types of CRM machines. 88percent of the CHCs provided CRM machinery on rent to the farmers. In 2019, each CHC received 35 enquiries on average, of which only 19 were serviced, i.e. 46 percent of enquiries received by CHCs went unserved.
- In 2019, the area covered by the CHCs increased by 128 per cent (12746 acres) compared to 2018 (5584 acres). The total area for which the machines were rented out in 2019 was 8809 acres compared to 2057 acres in 2018.
- The significant challenge while renting a machine is the higher demand for a particular machine and its limited availability. For CHC, delayed payment from the farmer is an issue. 60 percent of the due payment to CHCs were made within a month. Only 16 percent of rentals are received as instant cash, and just about 3 percent of the receivables became bad debt.
- A majority of PACS (60 percent) are "neutral" in satisfaction level regarding participation in the scheme. Similarly, a higher percentage of PACS are 'neutral' on the effectiveness of the scheme. Some of the PCAS is of the view that the CRM Scheme is non-beneficial.
- The High costs, poor support by the manufacturers and non-availability of the desired machinery are the other significant issues with the scheme. The delayed deliveries of machines is a major issue in purchasing by PACS.
- 42 percent of PACS did not receive any training for using the CRM machinery. The main source of training for the PACS is KVKs. The satisfaction level with the training is relatively low.
- Each PACS received on an average 70 enquiries for custom hiring, of which only 54 were serviced, i.e. 23% of enquiries received by PACS remained un-serviced. The number of hours the PACS rented the machines increased in 2019 compared to 2018, and the same is the case with the number of machines available.70 percent of the PACS do not have any targets for utilising the machine. Those that acknowledged having fixed targets found it hard to achieve. The utilisation of Rotavator, Zero Till, and Happy seeder is higher compared to other machines. Average earning is approx. Rs.80,000 for the respondent PACS. Some of the machines with PACS are grossly underutilised.
- Theprimary reasons for not taking the machine on rent is the non-availability of desired machines and not having a large tractor at their disposal. A majority of PACS viewed that farmers could not afford the rental amount and that due to a lack of operational skills, the farmers avoid taking machines on rent.

Key Takeaways

- The study highlights the need to reinforce the financial and non-financial advantages of crop residue management.

- The shift from burning to the usage of machines for residue management in the eyes of farmers is low and less pronounced as a majority are still fence-sitters indicating the benefits of machine use are not sharp and clear.
- There is a consensus emerging among farmers, CHC and PACSs that there is no negative impact of technology on crop and yield.
- Training plays an important part in the adoption of machines for residue management. Once farmers are trained to manage the fields more scientifically, technology will achieve better outcomes.
- The biggest hurdle for usage is access to desired machines in the time of need. It is essential to streamline access and linkage to machines for small farmers. CHC and PACS have to play a more significant role.
- Enforcement and effective monitoring are necessary to ensure serious off-take/ adoption of machines for residue management.
- Full awareness of the scheme and payment options should be provided to all the stakeholders.

SWOT Of CRM Scheme:



Source: Field Survey

Factors That Can Limit Burning:

Farmers were forthcoming in their suggestions that can help limit paddy residue burning practices in their areas, top suggestions are:

- Reducing price/rentals of machines,
- Improving the availability of the desired machine by encouraging CHCs, PACS to increase their machine utilisation,
- Just about 8% of the individual farmers rented out their machines (Rotavators, HS, and ZTD), covering an average of 6 farmers/machine and 31 acres /machine. One way

to increase machine usage and adoption is by encouraging rental participation from individual machine owners, thus improving machine reach to a larger section of needy farmers.

- Conducting better training and extension support/handholding of farmers.

It should be noted that farmers in no way resonate with cash incentives (Rs 100/qtl incentive) and the fear of Government enforcement action figured low (due to limited action in the past).

Way Forward

Based on the findings of the study, a two-pronged approach is suggested (Table 1) –

a) Steps that need immediate focus,

b) Steps that are required to be done during the season.

Table 1: Steps needs to be taken by the government

Key Deliverables	Immediate focus areas	During the season
Reinforce Government Seriousness		
• Strict enforcement of SMS adoption with Combine harvesters • Enforce machine utilisation by all CHCs to ensure maximum renting outside the group • Special check on all Combine operations (with SMS) and burning instances in mid-September. This period sets the mood for burning or non-burning.	1.1.1	1.1.2

Improve Coop and CHC machine utilisation tracking - what gets measured, gets improved		
• To improve accountability, machine usage monitoring system/platform should be implemented for CHC and PACS machines. • Set season-specific machine utilisation targets for CHC/PACS.	1.1.3	1.1.4
Enhance Machine adoption	1.1.5	1.1.6
• Conduct a detailed study (block/village level) around the spread of existing machines vs fire instance – identify gaps and prioritise fresh allocation of machines. • All applications to be cleared, orders issued and installation TAT to be ensured. Machines should be on the ground by 15th September. • Promote the purchase of machinery by paying 'Margin Money' • Price reduction – GST Waiver/Reduction	1.1.7	1.1.8
• Panchayats/Sarpanch to be made accountable for burning counts in their villages. • Enhance field level fire count monitoring and reporting – Village/farm boundaries to be mapped in the remote sensing platform for sharper monitoring.	1.1.9	1.1.10
Improve Service Support from Manufacturers	1.1.11	1.1.12
• Streamline the machine delivery process - cut down on machine delivery time. • Periodic machine check - ensure field calibration and problem-free operation – seasonal machine melas'/service camps at village clusters/PACS.	1.1.13	1.1.14
Training/Capacity building & Farmer handholding		1.1.15
• Increase training frequency in high burning villages. Use technology for wider reach (especially during restricted field activities), e.g., Zoom, WhatsApp, YouTube, VCs. • Training schedule to be widely advertised. • Build consistency in content. Training should focus on technology benefits, clarify myths, experience sharing, cost-benefit, and ease of operation.	1.1.16	1.1.17
• Create 'VatavaranSahayaks' with IEC funds - capacity building for village volunteers in all aspects of residue management – train the trainer and build community engagement.	1.1.18	1.1.19
Improve Usage of App for machine visibility to farmers	1.1.20	1.1.21
• Finalise which app to be promoted and with what features – Centre/State developed • At every training/demonstration, farmers to be encouraged to download the app on their phone	1.1.22	1.1.23
IEC campaign/mapping		1.1.24
• Create full-year Information, Education and Communication [IEC] plan • Standardise farmer communications - communication should bring out the region-specific value proposition, address the myths and misconceptions of farmers related to technology. • Promote success stories, invite progressive farmers who could influence.	1.1.25	1.1.26

Source: Field Survey

Proposed Improvement inthe Scheme

Based on the interactions with farmers and their feedback during the survey, the following improvements in the Scheme in the coming season.

- **Scheme timelines:** The entire process from the scheme's announcement, application, approval, and delivery should happen well in time. Farmers should get enough time to plan their season, promote their services/machines, align fellow farmers for rental, and plan training. The machines should be delivered to the farmers by 15th September positively.
- **Flexibility to choose a machine mix:** Farmers/CHCs/PACS should be given the flexibility to choose any mix of machines from the bouquet.
- **Targets for the district:** Targets should be fixed after reviewing the spread and usage of existing machines. Fund allocation should be aligned accordingly.
- **Robust technology platform:** A technological platform covering all the steps of implementing the scheme should be developed. The registration of farmers, inviting of applications and distribution of subsidy should be through the platform. The platform should be interactive so that any farmer, if facing a problem, can use it and interact with the officials.
- **Formation of groups / CHC:** The Formation of farmers groups is very informal; the platform created to register the group had operational issues. CHCs should have a control/ tracking (coding) process; a parallel can be drawn with the registration and control process for registering farmer clubs (by NABARD) or Self-Help Groups.
- **Appraisal of new CHC application:** There should be an appraisal process - the local agriculture officers should review CHC application against predefined parameters like experience in machine renting business, the mix of members and profile, rental potential, willingness to deliver the desired targets, adhering to reporting requirements to identify the actual target groups.
- **Performance of existing CHC:** Thetargets for CHCshave not been reviewed at any stage, resulting in most groups not performing as per CHC guidelines. There should be some mechanism for performance reviewing of existing CHC's.
- **Direct Beneficiary Transfer:** The subsidy should be transferred directly to the beneficiary's account without any delay. The time taken for physical inspection should be reduced so that the subsidy is transferred at the earliest to the beneficiary.
- **Pricing of machinery:** Farmers claimed significant machinery price increase immediately after scheme announcement. A market study should be done to look for ways to rationalise prices.

(Courtesy- Punjab State Farmers' and Farm Workers' Commission)

Climate change, competition, and the power sector

Prasanth Regy, Senior Consultant, Niti Aayog[1]

The recent Intergovernmental Panel on Climate Change (IPCC) Report has found that the climate is changing in an unprecedented manner. Along with global warming, climate change has also led to an increase in the frequency of extreme weather events, including more intense rainfall and flooding. The construction, operation, and maintenance of infrastructure needs to take these new climate patterns into account. In particular, power infrastructure (such as power plants, transmission and distribution infrastructure, and fuel supply arrangements) needs to be made resilient to climate change, with updated standards that are informed by an understanding of the changing climate patterns.

The Event

As an example, consider the snowstorm in Texas that happened a few months ago: in mid-February, the Texas power grid crashed during an unexpected, intense snowstorm. There are important lessons for us in India to learn from this tragedy about how even sophisticated markets can go wrong, especially in the context of extreme weather events potentially triggered by climate change.

Image Courtesy: https://kmscubreporter.com/12726/news/texas-death-toll-grows-to-over-100-from-winter-storm/#modal-photo

Background

The Texas electricity system is very lightly regulated. Texas policy makers expected that low regulation will spur competition and lead to low prices. Texas is the only U.S. state to have its own separate grid, largely isolated from the rest of the United States. While this allowed Texas to avoid federal regulation, it also makes it difficult for Texas to import power from other states to meet emergency shortfalls. Texas also has an energy-only market: power producers are paid only for the power they produce, and high peak prices are supposed to

1 https://www.hindustantimes.com/ht-insight/climate-change/climate-change-competition-and-power-sector-101632054544742.html
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incentivise producers to keep their plants operating in extreme weather. Texans are able to purchase electricity from a choice of suppliers offering a variety of contracts, and the cost of electricity is about 20% lower than the U.S. national average. But the designers of the system did not anticipate such extreme weather.

The Storm

When the snowstorm reached Texas, the demand for power shot up as people tried to stay warm. Most of the power produced in Texas comes from natural gas. Due to moisture content in the gas, many pipelines froze and gas supply shut down. Many wind turbines also had to be stopped because of icing on the turbine blades. Power transmission and distribution networks were disrupted by snow and sleet damage. When high demand and low supply coincided, the price of power shot up, and the regulator was forced to shed load by cutting power supply to many parts of the state. Millions of people were left without power for days, and over two hundred people died.

Lessons for us

We in India should learn from these events. The central government desires to achieve a market for power distribution with multiple competing utilities, instead of the monopolies that exist today. The expectation is that greater competition will benefit consumers by improving the reliability of electricity and reducing its cost. But competition will also drive utilities to reduce their costs as much as possible, to the limit of regulatory permissiveness. Even today, without competition, poor distribution infrastructure is identified as one of the reasons for the frequent power breakdowns in many parts of the country. When competition is added into the system, cost-conscious utilities may create new infrastructure (or overhaul existing infrastructure) with little thought of resilience, unless the regulator forces them to implement higher resilience standards. This situation is complicated by climate change. In the future, frequent extreme weather events will grow more common. If competing utilities cut the resilience of power distribution systems to the bone in an effort to save cost, we have the recipe for a disaster.

It is critically important to create and enforce updated standards for achieving an appropriate level of resilience. But this is not an easy task. If the resilience standards are too strict, consumers and taxpayers end up having to pay too much for overly hardened electricity infrastructure. If the resilience standards are too lax, it can lead to the loss of lives and livelihoods if an extreme weather event does occur. Choosing the appropriate level of resilience involves seeking a balance between these trade-offs.

Greater competition can lead to more choices and lower costs for customers. But if the market is not well-designed, the interaction between the market and the rapidly changing climate can lead to greater fragility. Legislators and regulators need to choose the appropriate trade-offs between increased resilience and higher costs, and mandate updated resilience standards for electricity grids and other essential infrastructure.

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