



The Climate Traid: Law, Economics and Technology In India's Constitutional Fight for Sdg 13

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Abstract

Climate change now is not only viewed as an environmental concern that we see, but it has now changed into a certain bigger level problem which now influences everything including our legal systems, our economies, technological advancements, and the protection of every individual's human rights as well as the fundamental rights.

This increasing frequency of extreme events have resulted into the loss of biodiversity, have disrupted ecological stability, and the livelihoods across the world. As these developments proceed into our world, they have highlighted the need for stronger legal framework that may be used to control and coordinated for this climate change so that sustainable development is accepted, and a coordinated policy responses are presented.

Both at our domestic and our international level, a legal framework should be present which will help our generations to survive. Our governments seek to balance these developmental aspirations with the environment which we are trying to protect. Thus, climate change is a defining challenge that requires the extreme steps, and is of extreme importance.

This is the global need, as we are amidst the crisis. The international community have adopted different agendas, including Sustainable Development Goal 13, climate action under the 2030 Agenda, and public policies. It also gives a path to different regional agreements such as Paris Agreement 2015, which was aimed for global warming, and the Sendai Framework for Disaster Risk Reduction, which promotes the preparedness and resilience against climate-induced disasters.

All these together, underline the effective change that the climate action is not merely an environmental object, but it requires our presence, as we are aiming for a sustainable future for our own upcoming generations. In this international scenario, India also plays an important role and has a unique constitutional policy landscape in addressing this challenge. While the country continues to pursue industrialization and different economical growth projects, which includes urbanization and economization, it also faces significant vulnerabilities around, which are arising through the climate change diversity, because it is adversely harming our mangroves, our coastal areas, and our geographical dependencies on natural resources, as we are the world's largest population.

Though several environmental statutes, including the Environmental (Protection) Act, 1986, the Air (Prevention and Control of Pollution) Act, 1981, and the Water Prevention and Control of Pollution Act, 1974, provides us a regulatory protection, India still lacks a comprehensive climate change legislation that specifically addresses mitigation, adaptation, accountability, and climate justice.

As a result of this, the constitutional interpretation and the judicial intervention, which is through judicial review and public interest litigations, have assumed a central role in shaping our country's climate governance framework. Many justices like the green judge of our country, P.N. Bhagwati, have played an active role in this. But in absence of a dedicated climate change statute, we do not have a specific law which only deals with climate change, our courts, particularly the Supreme Court and different High Courts, have played an increasingly significant role in addressing these disputes related to climate change.

Although the progressive constitutional interpretation and the judiciary has broadened the scope of environmental jurisprudence under Article 21, but it needs a safeguard which protects our ecological interests alongside the developmental issues. Against this problem, our study explores the evolving nature of climate change litigation in India through an interdisciplinary perspective that brings together the constitutional law, economics, technology, with a harmonious growth of our environment. this paper further argues that climate litigation has emerged as an important intrinsic instrument for advancing climate justice and supporting our sustainable development goal, despite the law gaps. A major aspect of this paper is to interpret the Article 21 of our Constitution, although the provision guarantees the right of personal liberty and this climate change in an umbrella sense, but it requires judicial decisions that comprehensively expand the scope and should specifically include climate change, clean health, and pollution-free environment as its offshoots

This paper also examines the significance of Article 48A, which directs the State to protect and improve the environment, which is a Directive Principle. Also, Article 51A(g), which places a fundamental duty on every citizen to preserve the natural environment.

When we read together our constitutional provisions which are mentioned above, all they try to do is strengthen our environmentalism, which is a core concept of constitutionalism in India. And it allows the courts to adopt right-based approach with climate-related issues. Also, this research paper focuses on the growing importance of public interest litigation in regards with the matters concerning pollution, ecological degradation, industrial regulation, and other failures in the environmental governance. In absence of a comprehensive climate law, our mechanism which bridge

the gap between legislative and administration implementation would collapse permanently. As a result, climate-related legislation has become a need of the hour for ensuring greater environmental accountability and encouraging timely action regulatory which provides our adequate responses.

If we look this paper from an economic point of view, our paper examines the challenge of balancing the environmental laws with the development of the economy of our country. Our courts frequently encounter the dispute which is between the ecological concerns with the industrial expansion and infrastructural projects, which causes the broader public impact. Such cases illustrate a complex relationship between economic development and our sustainable development. Therefore, our paper also evaluates how the judicial decisions influence this regulatory compliance project implementation with a long-term sustainability attempting to maintain an equilibrium between the priorities of our environment and the developmental goals for humans.

This paper also considers the importance of establishing environmental principles that have shaped India's approach towards climate-related disputes. Also, such doctrines which are important for our environment, which include polluter pay principle, precautionary principle, integrational equity and principle of sustainable development which have constantly guided the courts in determining the environmental responsibilities.

By examining legal judicial decisions, our paper demonstrates how these principles have balanced the sustainable resources with the development. Another important dimension of our paper is the role of technology in our contemporary government, which monitors and relies on environmental impact assessments, EIAs.

These technological tools have improved the efficiency of our assessments which are related to the environment and strengthened the evidentiary base for judicial decision-making. At the same time, our paper acknowledges practical challenges, including unequal access to reliable climate data, institutional limitations, technological disparities, and weakness in regulatory enforcement, all of which continue to affect implementation of climate change in India. Our paper also argues that although climate change litigation has made a meaningful contribution to our protection of environmental human rights, the advancement of climate justice has remained largely corrective rather than a preventive. Interference of judiciary generally occurs after environmental disaster have taken place, but addressing the violations of constitutional remedies instead of preventing them through a complex legislative framework. Our courts have played a vital role in interpretation of the constitutional existing laws, accountability, and lasting solutions to our climate change.

This paper will conclude that India is a significant place in the evolution of the climate governance framework, and it is able to achieve its sustainable development goal 13 and demands more judicial activism. Our country calls for a climate change law with a coherent public policy, which is stronger than any institutional capability, and which would have technological innovation and effective enforcement. This integrated approach, when combined with constitutional values and the sustainable development program, our technological advancement of India will become so stronger that it will address the key corrections in our climate change, furthermore, interest of both present and future generations.

Keywords: Climate Change; Sustainable Development; Constitutional Litigation; Judicial Activism; Economic Growth; climate litigation, constitutional law, sustainable development goal 13, environmental governance, and climate justice

Introduction

Climate change is a big deal now, and it's more than just an environmental problem. It messes with our health, jobs, nature, water, food, buildings, and the economy. Because extreme weather happens more often, climate change is now about how we govern, how we develop things, and fairness. Laws need to focus not only on reducing emissions but also on helping people adapt, making sure organizations are responsible, and looking out for communities that are most vulnerable to climate impacts.

The UN's Sustainable Development Goal 13 (SDG 13) really shows how important climate change is by pushing for quick action to tackle it and its consequences. SDG 13 wants to make things more resilient, help people and systems adjust, weave climate concerns into national plans, and boost the capacity of people and organizations to deal with reducing emissions, adapting, and managing disaster risks. So, climate action isn't just an environmental thing; it's tied into all the other goals for sustainable development.

This is especially tough for India. The country needs to grow its economy, lift people out of poverty, build infrastructure, and ensure energy security, all while facing growing climate risks. With a huge and diverse population, reliance on climate-dependent sectors, a long coastline, fragile Himalayan ecosystems, and fast-growing cities, managing climate issues is a major concern for its constitution and policies. Protecting the environment is part of constitutional rights because climate risks can get in the way of living a decent life.

India has put in place several policies and rules to deal with climate change. These include the National Action Plan on Climate Change, State Action Plans on Climate Change, and India's promises under the Paris Agreement. However, not having one single, main climate change law means that climate governance is spread out across different areas like the environment, energy, development, and disaster management. India has introduced several policies and regulations to address climate change. These include National Action Plan on Climate Change, State Action Plans on Climate Change and India's international commitments under the Paris Agreement. But the absence of one single, overarching climate-change law has resulted in climate governance being spread across various environmental, energy, development and disaster-management frameworks. The fragmented structure raises questions about institutional coordination, accountability and effectiveness of preventive climate action.

In this context, climate litigation has become significantly salient. Indian courts have slowly developed environmental

jurisprudence thru constitutional interpretation, public interest litigation and judicial review. Principles like sustainable development, precaution, polluter pays and intergenerational equity have provided significant legal tools to tackle environmental harm. The constitutional recognition of climate-related issues has further strengthened the nexus between climate protection and fundamental rights.

This paper examines this development through an interdisciplinary framework. It considers climate litigation not only as an environmental-law phenomenon but as a constitutional response to a problem involving economic choices, technological capacity and questions of climate justice. It argues that judicial intervention has played an important role in filling gaps in environmental governance, but long-term climate action requires a shift from corrective litigation towards preventive and institutionally coordinated climate governance. Such an approach would require constitutional values to operate alongside legislation, economic instruments, scientific evidence and technological systems in pursuit of SDG 13.

SDG 13 And India's Climate Governance

SDG 13 And International Climate Commitments

The adoption of the 2030 Agenda for Sustainable Development placed climate action within a broader framework of international sustainable development. SDG 13 calls on States to take action on climate change and its impacts. Its targets are not limited to emission reduction but also include improving resilience to climate-related hazards, mainstreaming climate measures into national policies and planning, improving education and institutional capacity, and developing mechanisms for effective climate-related planning.

SDG 13 is important because it acknowledges that environmental regulation alone cannot address climate change. Climate policy cannot avoid intersecting with economic planning, disaster management, public health, energy policy, agriculture, urban development and social welfare. Our governance hence, needs a systematic approach where environmental goals are imbibed into general governmental decision-making. International framework for ongoing national climate commitments is provided by the Paris Agreement. It requires states to communicate with nations for contributions and progressively strengths in climate action. In 2022, India presented its Nationally Determined Contribution, ruling out a framework for its climate commitments up to 2030. Thus, India's international commitments set an important policy backdrop for national climate governance. The connection between SDG 13 and the Paris Agreement is important for understanding how India handles its climate policies. SDG 13

offers a plan for sustainable development. The Paris Agreement creates a system for dealing with climate change based on what each country commits to do. It includes actions to reduce emissions adapt to changes and work together across borders. Neither of these approaches can replace the need for laws made within a country. Their success really depends on how they are turned into actual policies organizations and rules that are followed.

India approach to climate change has grown out of a mix of promises made to the world actions taken by the government laws for parts of the economy and court decisions. This leads to a question about the constitution: when climate policies affect basic rights or cause big changes, to the environment the way the government acts must follow rules that are fair, legal and can be checked by the courts.

The international climate framework also says how important it is to adapt to climate change. For countries like India taking care of the climate is not about reducing carbon emissions. We need to protect people from heat stress, floods, droughts, cyclones and other problems caused by climate change.

Sustainable Development Goal 13, or SDG 13, focuses on building resilience and adapting to climate change. It's a way to assess India's progress on climate change, looking at more than just cutting greenhouse gas emissions. When we talk about implementing SDG 13 in India, it's mainly up to the government. This involves integrating environmental protection with development plans. We need to consider climate change when creating policies, approving projects, planning infrastructure, and carrying out initiatives, rather than just reacting after environmental damage occurs.

India's Climate Vulnerability and Policy Framework

India's vulnerability to climate change stems from its physical landscape, large and varied population, economic makeup, and dependence on climate-sensitive industries like agriculture. As a result, climate change affects various sectors and threatens people's livelihoods, communities, and national security. Its impacts extend beyond environmental systems to food production, water availability, coastal areas, forests, and cities. India faces a complex challenge because it must achieve climate security while also meeting development needs. The country's development path will directly influence how vulnerable it is to climate change. To balance climate goals with development aims, India will have to work through various challenges within its political and economic system.

Policies related to development and climate should be seen as connected. Therefore, we must advance climate goals alongside development efforts because India's development needs cannot be stalled by climate concerns, and conversely, its climate objectives shouldn't be hindered by development issues. India's National Action Plan on Climate Change (NAPCC), established in 2008, is central to the country's climate policy. The plan encompasses national missions related to various aspects of climate change and focuses on adaptation to it while promoting ecological sustainability. The Government's climate-policy framework includes State Action Plans on Climate Change that were created to address climate change at the state level. Then comes State Action Plans on Climate Change which allows for the consideration of the specific characteristics of each state and territory as climate change affects different areas of the country in varying ways. The Ministry of Environment, Forest and Climate Change has recognized State Action Plans on Climate Change as critical to the implementation of the National Action Plan on Climate Change. It is evident that India has developed an extensive system for tackling climate change at multiple

levels. It has made various agencies and policies at the national level and has encouraged the adoption of similar measures at the state level. The National Action Plan on Climate Change is led by the Ministry of Environment, Forest and Climate Change, while other government agencies provide oversight and support.

In brief, India has taken a comprehensive approach to climate change by developing numerous initiatives at both the central and the state level. Nevertheless, the policy-based nature of much of India's climate governance raises critical questions about legality and accountability. Policies and programs can provide goals and focal points, but their implementation will require political and managerial work, involving budgetary allocations and intergovernmental coordination. Most importantly, without a climate law, India's climate legislation remains fragmented, as climate-specific goals were mainstreamed into existing laws and policies.

This is where the challenge of India's environmental governance becomes evident, as climate change considerations intersect with other sectors in areas such as project-related clearances, use of land planning, energy, transport, and development control.

Climate change considerations cut across multiple sectors, with climate assessments not always integrated as a stand-alone requirement in licensing, planning, and policy frameworks. This leaves climate law and policy in India as a set of disconnected areas, and not as a coherent whole. This, in turn, creates room for judicial oversight, as courts can intervene in cases where there is a need for environmental protection.

India's climate policy needs to be calculated not only by the number of policies but also by their impact on the ground and the ability to deliver goals in a timely manner. The challenge for India is to connect its endeavours to local legal accountability. At the level of principles, India has the Sustainable Development Goals, while at the level of practice, the Supreme Court, through judicial review, has the capacity to ensure climate governance in India meets the standards set out in the Constitution.

India needs to move from a policy-based approach to climate change to a more integrated one that connects climate governance to sustainable development, environmental impact assessment, planning, and technology. In addition, India needs to ensure coherence between international obligations and national law in order to ensure there is legal basis for climate cases in India and that climate justice is delivered.

Constitutional Framework for Climate Protection

Climate protection isn't explicitly stated in India's constitution. Instead, it has developed through interpretations of fundamental rights, state policy guidelines, duties, and the judiciary's role within the constitution. As a result, there's a lot of writing and case law about environmental constitutionalism. While the Indian Constitution doesn't mention climate change, the rights it guarantees have allowed the judiciary to consider climate change issues as falling under fundamental rights, specifically Article 21. Right to a Healthy and Sustainable Environment under India's Constitution The Right to life and personal liberty enshrined in Article 21 has been interpreted by the judiciary to include a person's right to a healthy environment. The Supreme Court rulings have shown that environmental quality is gradually being recognized by the court as a facet of life that must be protected from pollution and degradation.

In particular, the provisions for the right to life and personal liberty have been invoked to protect the citizens against environmental degradation, which was acknowledged as a threat to health, ecological systems, water, food, shelter, and livelihood. Moreover, due to their vulnerability, climate change impacts such as extreme weather, rising temperatures, flooding, and disease patterns are disproportionately borne by individuals. As such, climate change increasingly becomes a constitutional issue when its impacts reach the threshold of affecting health and well-being.

The *M.C. Mehta v. Union of India* judgment gave rise to the concept that a clean and healthy environment is intrinsically linked to the right to life for every individual. The Supreme Court articulated that a citizen has a fundamental right to protection from the adverse effects of climate change and that the right emanates from Articles 14 and 21 of the Constitution. The abovementioned ruling is significant in that it goes beyond the principle of pollution of the environment and recognizes climate change as a constitutional wrong.

The recognition of this right does not mean that each policy issue related to climate change may raise a violation of Article 21. It is necessary to consider the relevance of the damage, the interests protected, the scientific evidence, and the alternative public interests that come into conflict with it. The importance of development is linked to the need to recognize that such damage falls under the action of the constitution when it affects relevant interests.

The application of Article 21 to climate change issues highlights that environmental regulations can take on a rights-based dimension. Environmental regulations therefore not only have the dimension of administrative legality but also affect the rights of citizens to the protection of the environment and, consequently, to a safe and healthy life. The Court therefore has the competence to control state policy and actions of authorities and entrepreneurs in case of damage to the environment of significant importance.

Articles 48A and 51A(g)

Article 48A imposes on the State the obligation to endeavour to protect, improve the environment and conserve forests and wildlife, and Article 51A(g) imposes on citizens the duty to protect and improve the natural environment. Despite the absence of direct justifiability, these norms are of great importance for interpreting the Constitution, as they proclaim the importance of conserving the environment as a fundamental value.

The formulation of these articles indicates that environmental concerns are of such importance that they must be considered in all areas of public policy, including socio-economic development policies. In addition, the Supreme Court decisions confirm that the Court considers environmental damage to be within the scope of action of the Constitution. Thus, in the judgment in the case of *M.K. Ranjit Singh*, the Supreme Court highlighted the connection between Articles 48A, 21 of the Constitution.

Thus, while Article 48A determines the obligation of the State, Article 51A(g) clarifies the duties of citizens. These Articles indicate that environmental protection is a goal that must guide the actions of the State and society. In particular, combating climate change requires transforming not only legal relations but also institutional practices, economic and social relations, and ways of life. Therefore, constitutional norms on the environment have both interpretive and direct impact on state policy.

Articles 14, 32 and 226

Article 14 obligates the State to ensure equality of all persons in whose name and for the benefit of whom the Constitution was adopted. Since climate change affects people differently, depending on their social and economic status, it may violate the right of vulnerable groups to equality. Thus, according to the Supreme Court in the judgment cited above, climate change often brings about inequality in the enjoyment of rights enshrined in Article 21 (“the right to life”).

Articles 32 and 226 of the Constitution provide for remedies for the protection of fundamental rights, including Articles 14 and 21. In particular, Article 32 provides citizens with access to the Supreme Court in the exercise of their rights, and Article 226 specifies the writ jurisdiction of the High Courts. Environment-related Public Interest Litigation (PIL) is a specific mechanism for asserting these rights, as PIL allows people who are unable to do so to bring cases before federal and state courts. Thus, these articles ensure that constitutional rights are protected in practice. Therefore, while Article 21 contains the fundamental rights framework, Articles 14, 48A, 51A(g) contain the constitutional obligations of the State. The norm of Article 32 and 226 provides for the possibility of turning to the Court for the protection of these rights.

Evolution of Climate Change Litigation In India Environmental PIL and Judicial Review

The Indian climate litigation drew extensively from the older environmental public interest litigation (PIL) jurisprudence. Environmental PIL emerged as a mechanism for addressing concerns raised by industrial effluence, deforestation, hazardous activities, water pollution and ecological degradation. Through the medium of public interest litigation, the Court was able to intervene in situations where the environment was affected and where environmental law enforcement was deficient.

The environmental PIL jurisprudence, as developed in the cases of *M.C. Mehta v. Union of India* and *Indian Council for Enviro-Legal Action v. Union of India* enabled the Court to go beyond private law remedies and take broader regulatory decisions. India’s climate change litigation jurisprudence can benefit from the experience of PIL in addressing environmental law enforcement, by utilising judicial review as a mechanism for scrutinising regulatory decisions on environmental clearances for projects. It is also pertinent to note that the jurisdiction of the Court in examining such matters is not bound by the constraints of private law, as explained in the discussion above. While the separation of powers demands judicial restraint in policy formulation, India’s climate litigation jurisprudence can utilise the opportunities available under judicial review in public law litigation, to ensure that climate protection goals are achieved without undermining other social objectives such as economic development.

Environmental Principles in Climate Litigation

India’s environmental PIL jurisprudence offers several principles that can be used as tools in climate litigation. One such principle is the precautionary principle, which can be applied in cases where the quantum of scientific evidence is insufficient for taking effective regulatory action. Judicial endorsement of the precautionary principle is especially useful in climate change litigation, as the scientific uncertainty surrounding climate sensitivity is often used as an excuse to avoid committing to mitigation measures although the potential impacts are irreversible and far-reaching.

The Supreme Court recognised the precautionary principle and the polluter pays principle as part of India’s environmental law framework in the case of *Vellore Citizens’ Welfare Forum v. Union of India*. The Court held that sustainable development, the precautionary principle and the polluter pays principle “are now well-established norms of India’s environmental law jurisprudence.”

India’s climate change litigation can utilise these principles as tools for ensuring that the government adheres to its commitments under international law and implements climate-friendly policies even in the face of scientific uncertainty. Another principle that could be applied in climate litigation is that of sustainable development. The principle of sustainable development, which holds that economic development should be incorporated with environmental protection in policy design, is especially pertinent in climate change law. Climate change litigation often deals with questions of energy security, infrastructure development, industrialisation, transport, and minerals, and the environmental impacts of these activities. Therefore, India’s climate change litigation can utilise the principle of sustainable development to ensure that environmental costs are factored in when considering projects that contribute to India’s economic growth.

Overall, India’s climate change litigation can benefit from the wealth of environmental PIL jurisprudence by applying existing principles in a manner appropriate to the unique nature of the climate change context. While principles such as precaution and sustainable development have been applied in environmental law to address industrial pollution, they can be used in climate change litigation to address the challenges posed by emissions and their long-term effects.

Right against the Adverse Effects of Climate Change

The case of *M.K. Ranjitsinh v. Union of India* is significant for India’s climate change litigation jurisprudence since it brought the question of climate change before the Court for the first time. The case dealt with the issue of

conservation of the Great Indian Bustard in the context of renewable energy development, and the Supreme Court examined India's obligations under the Paris Agreement as well as the National Action Plan on Climate Change. In doing so, the Court highlighted the need for a climate change law in India and discussed the contours of a "right against the adverse effects of climate change."

While the Court acknowledged that the Union of India did not have a specific law on climate change, it held that the rights guaranteed under Articles 14 and 21 of the Constitution of India provided individuals with a fundamental right to a healthy environment. Furthermore, the Court held that the threat posed by climate change to vulnerable sections of society was disproportionately high, and therefore, the government had an obligation to take remedial action.

This development in India's climate change litigation jurisprudence is significant for two reasons. First, it established the fundamental right against the adverse effects of climate change in India, and secondly, it enables climate change litigation to utilise the framework of fundamental rights to question the adequacy of policy measures to combat climate change. However, the Court's discussion on the right against the adverse effects of climate change also illustrates the difficulties posed by climate adjudication, given the need to balance between diverse environmental objectives. The issue before the Court was whether conservation of the Great Indian Bustard would adversely impact the availability of land for renewable energy projects. On the one hand, the construction of solar and wind energy farms would cause indirect harm to the Great Indian Bustard, while on the other hand, the conservation efforts would deprive states of valuable land for the development of infrastructure. Given the importance of transitioning towards a low-carbon economy, the Court held that the conservation of the Great Indian Bustard would be considered as a legitimate setback for the larger goal of climate change mitigation.

Role of the Supreme Court and High Courts

India's climate change litigation jurisprudence has primarily been shaped by the Supreme Court's efforts to develop the environmental PIL framework, and the environmental law-related mandates of the High Courts. The Supreme Court has examined a wide range of climate change-related issues including climate justice, the right to a healthy environment, and environmental principles such as sustainable development, the precautionary principle and the public trust doctrine. Furthermore, its recent interventions in climate change litigation have provided the High Courts with additional guidance in addressing local environmental concerns.

The High Courts, on the other hand, serve as the first line of judicial redress for addressing climate change-related issues. This is especially true for environmental litigation since most disputes pertain to implementation of local laws and regulations, enforcement of environmental clearances, and adjudication of disputes over land use, infrastructure development, and pollution control. The writ jurisdiction of the High Courts under Article 226 of the Constitution enables them to examine administrative action as well as issues relating to the enforcement of fundamental rights, thereby playing an important role in climate change litigation.

India's climate change litigation jurisprudence is guided by the extensive environmental PIL jurisprudence of the Supreme Court as well as the environmental law-related mandates of the High Courts. However, the climate litigation process cannot be a substitute for the need for comprehensive climate policy, and judicial mechanisms should complement legislative and administrative action in combating climate change.

Climate Litigation: Law, Economics And Climate Justice

Sustainable Development and Economic Growth

Environment litigation often deals with the conflicts between environmental and developmental values. Infrastructure, power projects, mining, transport, and urbanization command huge economic benefits but result in negative environmental outcomes. The debate on the irreconcilability of developmental and environmental needs is an oversimplification of the issue.

The concept of sustainable development provides a framework for considering the alternatives, suggesting that development must occur without damaging the environment or compromising future generations' ability to meet their needs. A climate litigation case *Narmada Bachao Andolan v. Union of India* dealt with the issue of balancing developmental and environmental needs for sustainable development that considers the long-term environmental impact of the proposed actions. Thus, the case's analysis shows that environmental law does not forbid all forms of development but calls for considering the impact on the environment while making policies.

The problem of climate change adds another layer to the debate on balancing developmental and environmental needs. The effect of greenhouse-gas emissions often remains unaccounted for during the early stages of a project's implementation. A highway, factory, or thermal power plant will certainly yield economic benefits and provide jobs and profit. Still, the emissions of such projects will affect many people, making climate litigation an inherently distributive question of assessing who gains from a particular project and who has to bear the damage to the environment.

Thus, a climate litigation case dealing with the negative environmental effects of a developmental project should examine the distribution of benefits and losses associated with the intended action. A court should analyze if the proposed action would create a disparity between those who profit from the project and those who suffer damages and if the polluters would be held accountable for their actions. This accountability may be achieved through the implementation of the polluter pays principle, which environmental law often employs.

Polluter Pays and Environmental Externalities

The polluter pays principle effectively addresses the issue of environmental externalities by making the entity, which causes pollution, accountable for the damage. The pollution caused by greenhouse-gas emissions creates negative

externalities for the majority of society, as the costs of emissions in terms of environmental damage, are distributed among all members of society. However, those who contribute to such emissions are the ones, who benefit from them directly.

Greenhouse-gas emissions are a perfect example of negative externalities, as the profits from fossil-fuel production are oftentimes privatized, the environmental damage caused is shared by all members of society. Thus, the polluter pays principle aims to internalize these costs by making polluting entities pay for the damage done to the environment. But it can be much more complicated to attribute and quantify for climate. Emissions that cause climate change are due to human activity, but that activity generally occurs in a variety of centers, and it is often difficult to attribute it uniquely to a particular source. This complicates the application of traditional liability models to the entire system. That said, the basic economic point remains – that negative externalities should not be totally excluded from decision-making process.

Intergenerational Equity and Climate Justice

The climate change is likely to be one where intergenerational equity is of particular importance, as the effects of emissions can persist for centuries meaning that the costs of current economic activity can be disproportionately borne by future generations. Intergenerational equity must be included in any discussion of sustainable development. By definition, development that uses up resources in a way that they are not available to future generations is not sustainable. Thus development should not only consider present costs and benefits but also the impact on the future society's ability to provide for itself.

However, justice also has an collective aspect. Climate impacts are likely to be disproportionately felt by those who have the least power to prevent them for example, by difference of location, economic status, reliance on natural resources, or a combination of these factors. Thus, the principle of equity as applied to climate change needs to account for differential vulnerability as well as differential responsibility.

The formulation proposed by M.K. Ranjit Singh in the section on equality is applicable to climate justice as well.

Technology And Climate Governance

EIA and Scientific Evidence

Environmental Impact Assessment is an important mechanism for taking environment into account during the decision-making process concerning development before the implementation of a project. EIA includes screening, scoping, consultation, and appraisal functions for projects under its jurisdiction. Moreover, the government has called the EIA Notification, 2006 a mechanism that seeks to integrate environmental concerns at the decision-making level.

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Science is crucial for environmental governance. In environmental law disputes, the judiciary often has to decide on counter-specialty claims and environmental reports, with technical issues being at stake. The Supreme Court's environmental jurisprudence emphasises the value of science in environmental governance. Science has become a/an indispensable yardstick for judicial intervention in matters concerning Environment and Natural Resources. At the same time, the judiciary needs to ensure the authenticity of scientific information and the reliability of scientific research, analysis and reports, to ensure that they are not dependent on the biases of their creators.

Climate Data, GIS and Remote Sensing

Technology today has made it possible to generate a lot of data that can be used to monitor the environment. GIS and remote sensing can be used to track environmentally sensitivity in mangroves, forests, coastal areas, and other ecosystems. Additionally, these technologies can be used to track sensitive areas like regions with high potential for

landslides, flood-prone areas, environmentally sensitive regions affected by climate change, and many others. Similarly, such technologies can contribute to tracking climate commitments and ensuring that the policies formulated by the government are implemented.

By using climate data, the environment can be taken care of in a preventative, predictive mode. Instead of waiting for the environment to reach a certain level of degradation, which then requires the judiciary to step in, environment-friendly governance can be implemented using technology to predict and prevent environmental damage.

However, the problem is that often such technologies are only available with specific people while the affected people do not have access to them. In fact, such an absence can lead to a larger governance problem where technology creates new asymmetries of power between those who control data and those who have limited access to it. Thus, it is necessary to ensure that technology is used as a tool of transparency, and accountability to bridge the gap between the people and the policymakers by making sure that the scientific information is accessible and verifiable.

Technology, Accountability and Judicial Decision-Making

Technology can play a critical role in ensuring accountability, especially in the context of judicial review of executive actions. Using satellite data, judiciary can verify whether the executive's claims about the environment are true or not. For example, when disputes arise regarding forest cover, use of such data and technology can be extremely useful in helping the judiciary in ascertaining the truth.

At the same time, however, the judiciary should be aware of the limitations of such technologies and should take care that due process is followed when reviewing such evidence. Therefore, instead of substituting scientific institutions, the judiciary can use such technologies to ensure that environment-related decisions and actions are evidence-based, scrutinize the authenticity of such evidence, and act upon it.

The Need for a Comprehensive Climate Change Law In India

India has many environmental laws on pollution, forests, wildlife, bio-diversity and environment protection. Climate laws take the form of energy legislation, executive-driven programs and policies. But these laws are not a framework for climate governance. In the case of M.K. Ranjit Singh, the Supreme Court acknowledged India's gaps on climate legislation. It observed that although India has a number of laws and policies pertaining to climate, it does not have an overarching law on climate change and related issues. The problem is not that India does not have a Climate Change Act, but that it does not have a framework to deal with climate change, its regulation and institutional mechanisms for estimation, mitigation, adaptation, reporting and accountability.

The challenge, therefore, is not only to have a legislative act titled the Climate Change Act, but to have a legal framework that defines and delimits mandate and punishment for violations. Fragmented laws can lead to divergent, non-joined up, approaches to climate governance. Climate change intersects with a number of issues that fall under the purview of multiple legislations and regulatory authorities. For instance, environment clearances, energy regulation, disaster management and urban planning have some overlap with climate. A comprehensive framework can help provide coherence without doing away with the extant laws.

A climate change law needs to address both, mitigation and adaptation. Mitigation refers to reduction or avoidance of greenhouse-gas emissions, while adaptation refers to the processes and actions that take place to cope with climate impacts.

Indian climate law and policy needs to go beyond a solely emissions-focused paradigm because while mitigation will reduce future warming, adaptation is required for both current and future impacts. The law needs to provide for a mechanism for accountability. India's climate change mitigation and adaptation targets will have little efficacy if there is no mechanism to track progress towards these goals. The primary objective of a climate change law needs to include institutionalizing mechanisms for assessing implementation and reporting on climate actions undertaken, with details on who will be responsible for doing so – at the Union and state levels, as well as at the local level.

A statutory framework can also provide for periodic assessment of climate risks and incorporating these in major public infrastructure and planning processes that have significant implication on the environment. This will help in preventive governance and reduce the need for litigations on climate issues.

There should be institutional and legislative measures to support a climate framework and make it effective. For the purpose of formulating indicative climate goals, a nation-wide institutional machinery may be required, with scope for states to act according to their needs and geography. The impact of climate change will be different for each, and so it's important to leave the planning to the states." The legislative framework should focus on dissemination of reliable information, which will assist in policy formulation, evaluation, dispute resolution and litigations. "Uniformity in the assessment and reporting of climate risks system would lead to a reduction in disparity among different agencies. The climate change framework, if applicable to the national level, may also incorporate economic based measures to internalize environment costs in relevant sectors. It must be kept in mind while designing such measures that the adverse impact on the weaker sections of the society is taken care of.

Finally, it is important to keep the judiciary as an integral part of the climate governance framework. The judicial review process must be in place so as to enable the courts to pass necessary orders in case of an administrative action being found legally or constitutionally incorrect. The legislative framework, therefore, must not bypass the judicial system but provide suitable parameters for reference in judicial review.

Conclusion

The issue of climate change has irreversibly altered the relationship between environment, constitutional law, and governance. India's rich constitutional resources have been instrumental in this process. Articles 14, 21, 48A, 51A(g),

32 and 226 of the Indian Constitution have played a critical role in the evolution of climate jurisprudence. The process has now reached a level where the Supreme Court has in the case of *M.K.Ranjit Singh* laid down certain principles relating to the constitutional mandate for combating climate change. It is now firmly established that climate change impacts the very fundamental rights of the people so, has to be addressed using the very best tools available to the nation.

However, it must be understood that individual litigation cannot be the answer to the complex issues related to climate governance. The whole purpose of climate litigation is to focus on future risks and not on the dispute already arisen. Principles of sustainable development, prevention, polluter pays, intergenerational equity, etc., have to be built into the decision-making mechanism if India has to effectively deal with the challenges posed by climate change. The system of climate change governance in India should capitalize on India's strength in constitutional, judicial, legislative, economic, scientific, and technological domains. While India has undertaken various efforts in this regard, there is a need for adopting a more systematic approach. There should be a climate change law in India which will lend legal strength to the entire process of climate governance and thereby ensure that the mitigation and adaptation measures get a boost. The very nature of the law will ensure that the process of climate justice gets fulfilled through this process, while leaving the matter of adjudication to the judiciary. Such a law will indeed make the climate governance process people-centered. The matter of climate governance in India should thus be considered in a holistic manner, one that would involve making a shift from the present reactive process of climate governance to the proactive process of climate governance through sustainable development. In this connection, it is essential for us to realize that the SDG 13 can be achieved if we develop such a model which includes climate change as part of the development process.

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