

# SUSTAINABLE DEVELOPMENT FOR ENVIRONMENTAL PROTECTION IN BANGLADESH: CHALLENGES AND OPPORTUNITIES

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<https://doi.org/10.55327/jaash.v12i1.470>

(Received: 5 July 2026; Accepted: 5 September 2026; Published: 30  
Septemer 2026)

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**Keywords:**  
Sustainable;  
Development;  
Environmental;  
Bangladesh; Climate;  
Challenges;  
Opportunities;

## ABSTRACT

Bangladesh exemplifies a central paradox of sustainable development: how to maintain rapid economic and social progress without undermining the ecological systems upon which development depends. This paper critically examines Bangladesh's environmental governance architecture, the major barriers to its effective implementation, and opportunities for achieving a just green transition. It adopts a qualitative, desk-based methodology combining doctrinal legal analysis with critical examination of national policies and plans, international commitments, judicial decisions, and institutional reports.

The analysis demonstrates that Bangladesh has an extensive environmental legal and policy framework, including constitutional

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obligations, pollution-control legislation, environmental courts, climate strategies, and long-term delta planning. However, its implementation remains constrained by fragmented institutional authority, inconsistent enforcement, inadequate monitoring capacity, weaknesses in environmental assessment procedures, limited local government capacity, and continuing incentives for environmentally harmful investments.

Climate vulnerability further intensifies these governance challenges, disproportionately affecting low-income and climate-vulnerable communities. Nevertheless, significant opportunities exist for a just green transition through renewable energy, resource-efficient industries, circular production systems, nature-based adaptation, sustainable agriculture, green finance, and digitally enabled environmental accountability.

The paper proposes a reform agenda centred on enforceable environmental standards, strategic environmental assessment, open environmental data, stronger institutional coordination, enhanced local capacity, effective application of the polluter-pays principle, and meaningful public participation. Sustainable development in Bangladesh will become credible only when environmental protection becomes a binding condition of development decision-making rather than a remedial response after environmental damage has occurred.

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## INTRODUCTION

The concept of sustainable development has been manifested in most cases as a trade-off between economic development, social inclusion and the environment. But in practice, it is a rule concerning the quality and distribution of the development. Growth is not sustainable where it brings in short-term income at the expense of air, water, soil, forests and human health at a price that diminishes future welfare. The Brundtland formulation of ensuring that the needs of today are fulfilled without endangering the capacity of future generations to fulfill their needs has

continued to be influential since it links the responsibility of reducing poverty with intergenerational responsibility [1]. This principle was then projected into an interdependent set of goals by the 2030 Agenda where poverty, health, water, cities, production, climate and ecosystems were to be tackled [2]. Environmental protection is thus not a conflicting sectoral goal. It belongs to the productive and social basis which the long-term development relies.

Bangladesh is particularly a significant location where one may study this relationship. The country has made giant strides in income, health, education, electrification and disaster management as it has gone through a rapid industrialisation and urbanization [5]. But these benefits are in balance with intense air and water pollution, wetland loss, irresponsible waste management, forest and biodiversity stress, and extreme exposure to cyclones, floods, heat waves, salinity and sea level. According to the World Bank, all these pollute the air, unsafe water, poor sanitation and hygiene, and lead cost more than 272,000 premature deaths a year and 17.6 per cent health costs relative to gross domestic product [3]. This number is not the measure of how environmental damage literally takes away that share of the quantifiable output annually; it represents the burden of welfare and health in economic language. Despite this qualification, the scale shows that the ecological degradation is a macroeconomic and human-development constrain.

These risks are not the ones that Bangladesh has overlooked. Article 18A of the Constitution guides the State to safeguard and enhance the environment and conserve natural resources, biodiversity, wetlands, forests and wildlife to benefit both the current and future citizens [4]. The Bangladesh Environment Conservation Act 1995 established the major statutory authority of control of pollution and environmental clearance [5]. With the Environment Conservation Rules 2023, key regulatory processes and norms were updated, and the Environment Court Act 2010 created forums of specialisation in environmental violations and payments [7]. A growing variety of strategic tools, such as the National Environment Policy 2018, Bangladesh Climate Change Strategy and Action Plan, National Adaptation Plan 2023-2050 and Bangladesh Delta Plan 2100, offer more and more detailed descriptions of resilience and ecological management [8]. Bangladesh is also a signatory to the Paris Agreement, and has expressed mitigation and adaptation priorities via its nationally determined contribution [13].

The inseparable gap between formal commitment and environmental outcome is the central research problem. Statutes and policies are scattered through ministries; regulatory agencies have staff shortages, and lack laboratories, data and enforcement power; and the development approvals often view environmental assessment as a procedural paper hoop to jump through, instead of a decision-making tool. The expenses of this disjuncture are not equally distributed [11]. The less fortunate households have fewer resources to prevent pollution, clean up after a disaster or even say no to a project, informal workers, women, children, people with disabilities,

indigenous peoples and coastal communities and so on tend to have less to contribute to preventing pollution. Environmental justice and aggregate efficiency should thus be used to gauge sustainable development.

The four questions in this paper are as follows: What legal, institutional and economic aspects hinder environmental protection in Bangladesh? What is the level of effectiveness of the current governance structure? What possibilities exist to balance protecting the ecology with inclusive growth? How can policy commitment be transformed into action? The research will seek to deliver a legal-policy solution. It has a role to play in its ability to relate environmental law, institutional design, climate resilience and green economic transformation instead of viewing it as an independent agenda. Arguing here is that Bangladesh has a plausible strategic background, but sustainable development needs a transformation towards project-by-project remediation to preventive, transparent and territorially combined governance.

### **CONCEPTUAL AND ANALYTICAL FRAMEWORK**

The four concepts have been brought together in the analytical model: ecological limits, integration, justice and accountable governance [10]. Ecological limits appreciate that economic activity is integrated into natural systems. The assimilative capacity of rivers is finite; aquifers recharging is at a slow rate; forests and wetlands have services that might be lost forever; and greenhouse gases are built up through generations. Sustainable development does not prohibit the use of resources, except that the magnitude and mode of using the resources should maintain the critical natural capital and should not pose any unacceptable risk. The precautionary principle advocates the preventive measures in case of plausible threats of severe or irreversible damages even where scientific certainty is not complete [14]. Polluter-pays principle places the costs of prevention, controls and remediation on the same people who cause pollution and such costs do not have to be passed on to the communities and the public treasury [15].

The environment needs to be taken into consideration during the integration in order to involve fiscal, industrial, energy, transport, agricultural and urban decisions at an early stage. The key element of project-level integration is environmental impact assessment (EIA) which is inadequate whereby cumulative harm occurs due to multiple projects or the whole policy [11]. Strategic environmental assessment (SEA) goes further to analyse policies, plans and programmes and allows alternative development directions to be evaluated before the patterns of investment are entrenched. The preventive nature of assessment is endorsed by international law. The International Court of Justice in the Pulp Mills case, considered EIA as an imperative of the general international law where the proposed industrial activity threatens to cause severe transboundary damage [16]. To Bangladesh, a more generalized interpretation as to why assessment should make a difference on approval terms and options is

because assessment should not merely record the impact after the ideal project has been decided upon.

Justice introduces distribution, recognition and participation to the environmental decision-making. Distributional justice poses the question of beneficiaries of development, and victims of pollution, displacement and disaster risk [12]. Recognition involves institutions to learn the unique identities, livelihoods and knowledge of the impacted groups. Procedural justice requires access to information in good time, consultation that is meaningful, decisions that are well-grounded and an access to remedy. These aspects indicate that Principle 10 of the Rio Declaration, which connects environmental governance with access to information by the masses, participation and justice [15] is reflected here. They are also consistent with the constitutional expansion of standing in *Dr Mohiuddin Farooque v Bangladesh*, which empowered public-interest environmental litigation, and the establishment that ecological harm can impact the general community [17].

Responsible governance deals with institutions that transform ideals into action. A good system must have clear mandates, believable monitoring, proportional punishments, judicial consideration, open information and feedback among national and local governments [9]. It should also be coherent in policy: activities that have their damage to the environment subsidised by one ministry should not be the ones where another agency does not have the capability of regulating them. The paper will measure the framework of Bangladesh in five terms, namely: legal adequacy; institutional coordination; implementation capacity; participation and transparency; and alignment of finance with sustainability. Opportunities are evaluated in terms of their ability to bring about environmental enhancement, economic value, social inclusion and resilience in tandem.

### **METHODOLOGY**

The research design is qualitative, desk-based research. It integrates constitutional interpretations of the constitutional clauses, laws, regulations and judicial rulings with critical policy discussions of national policies and global tools. Primary documents are the Constitution, the Bangladesh Environment Conservation Act 1995, the Environment Court Act 2010, the Environment Conservation Rules 2023, the national environmental and climate policies, the Bangladesh Delta Plan 2100, the Paris Agreement and the nationally determined contribution by Bangladesh. The major source of secondary evidence is institutional evaluation of the World Bank, United Nations agencies, Intergovernmental panel of climate change (IPCC) and other recognised agencies. The dissertation materials provided in the initial dissertation were revised to determine the pertinent themes, legal materials and policy questions that were Bangladesh specific; redundant discussion and unsubstantiated claims were removed.

The use of thematic coding involved examination of documents. The initial coding group encompassed environmental pressures: air and water

pollution, waste, ecosystem decadence and climate threats [14]. The second was governance restraints: fragmentation, enforcement, technical capacity, assessment quality, corruption, participating, finance and data. The third areas of the opportunities that have been captured are clean energy, green industry, circularity, ecosystem-based adaptation, climate smart agriculture, finance and digital monitoring. The fourth reform mechanism and institutions. Triangulation of findings was done through legal texts, policy statements and empirical reports. Quantitative data is employed only in rare cases and has its source and conceptual meaning. The approach is suitable since the research questions are about whether or not a governance system is coherent and implemented, and not about causal estimation based on a new survey or an experiment. It however has drawbacks [13]. Official plans could be a description of what is intended rather than what is done; national averages can mask local difference; and the policy environment can change quite fast thereby impacting on individual programmes. The article thus does not attempt to argue that documentary commitment is implementation. It considers recommendations as analytically derived reform agenda, not experimentally validated interventions. More research can be done in the future by adding more strength to this analysis, that is, interviewing the regulators, the local authorities, the industry, the courts and the affected communities, and longitudinal environmental monitoring, and a comparison of sub national cases.

## **ENVIRONMENTAL AND DEVELOPMENT CONTEXT**

The interplay of population density, concentrated industry, energy and transport decisions, unplanned urban growth, intensive agriculture and exposure to climate are some of the environmental pressures faced by Bangladesh. Transport emissions, construction dust, industrial combustion, brick production and regional sources cause ambient air pollution. Fine PM is carried deep into the lungs and blood where it can lead to respiratory disease and cardiovascular disease. The resulting strain lowers labour productivity, increases domestic medical expenditures and strains government health services [3]. Airshed problem cannot be solved by regulation that is necessitated by individual factories. Emissions inventories, fuel and vehicle standards, clean building practice, constant monitoring, public disclosure and regional coordination are necessary to ensure that the situation is effectively controlled.

Water pollution is a mixture of untreated or under-treated industrial effluents, municipal sewage, solid waste, runoff and encroachment of agriculture. Pollution of rivers is beyond the carrying capacity of rivers around Dhaka and other industrial centres [15]. The textile, dyeing, tannery, chemical and food-processing industries result in export income and employment, but poor compliance externalizes treatment costs. The reliance on groundwater poses a second danger: over-abstraction may decrease supply and combine with water-quality threats. Sustainable water

governance should then operate at river-basin and aquifer level, relate land use and drainage, and to regard wastewater as a resource where safe reuse can occur.

Similar institutional fragmentation can be seen in solid waste management. Cities usually have no full coverage in terms of collection coverage, source separation, safe disposal facilities and reliable data. The leakage of plastics prevents drainage, enhances waterlogging, damages aquatic ecosystems, and breaks down into microplastics. Proximate exposure is caused due to the electronic waste and hazardous industrial waste which is dealt with by informal workers who may be unprotected [18]. It has a circular strategy that starts at the upstream level by designing products, reducing materials and increasing producer responsibility, and facilitating separation, reuse, recycling and safe residual disposal. Capital-intensive systems should not take the place of informal waste workers but the registration, occupational protection and equitable buying measures should be implemented to integrate them into the institutional fabric.

The development infrastructure is the biodiversity and ecosystems. The Sundarbans dampens storm surge, stores carbon, sustaining fisheries and livelihoods and has ecological importance across the world. Wetlands store floodwater, recharge groundwater, sustain agriculture and fisheries, as well as cool down urban areas. Soils are covered and watersheds are controlled with hills and forests. They are persistently under-valued in the realm of economics as a large number of their services are not exchanged on classic markets. It is thus possible that conversion can seem lucrative to a single developer even in cases where it subjects society to even greater losses. Conservation, sustainable use and fair benefit sharing is obligatory in the Convention on Biological Diversity [18], whereas the wise use of wetlands is offered in the Ramsar Convention [19]. Such requirements ought to be indicated through land-use zoning, project assessment and government investment.

Any underlying weaknesses are increasing with climate change. South Asian deltas and coastal settlements are defined by the IPCC as the areas that are the most vulnerable to sea-level rise, excessive rainfall, heat and compound risks [20]. Effects of salinity in Bangladesh impact on drinking water, soils and agriculture; river erosion and cyclones forcibly migration of households; extreme heat endangers workers in agriculture, construction and manufacturing. The socially differentiated factors of climate risk are land tenure, income, occupation, age and gender. Adaptation cannot be thus also narrowed down to embankments. It needs sturdy shelter and services, proactive social protection, diversified livelihoods, heat action plans, ecosystem restoration and planned mobility that safeguard rights and dignity.

Table 1 provides an overview of the selected indicators, which are applied in the analysis [17]. The values are not brought out in the form of a comprehensive environmental narrative; they demonstrate the magnitude, multidimensionality and policy significance of environmental loss. Notably, indicators ought to be updated by a national environmental

information system to enable policy respond to trends and not individual studies.

**TABLE 1. SELECTED ENVIRONMENTAL AND POLICY INDICATORS**

| Indicator                                                                                                    | Reported value or policy horizon | Significance                                                      | Source                        |
|--------------------------------------------------------------------------------------------------------------|----------------------------------|-------------------------------------------------------------------|-------------------------------|
| Premature deaths associated with air pollution, unsafe water, poor sanitation and hygiene, and lead exposure | More than 272,000 annually       | Shows the national health burden of environmental degradation     | World Bank [3]                |
| Equivalent health cost of the same environmental risks                                                       | 17.6% of GDP                     | Welfare-cost estimate; not a direct subtraction from measured GDP | World Bank [3]                |
| National Adaptation Plan horizon                                                                             | 2023–2050                        | Provides medium- and long-term adaptation priorities              | MoEFC [10]                    |
| Delta Plan horizon                                                                                           | To 2100                          | Supports adaptive water, land and disaster-risk planning          | Government of Bangladesh [11] |
| Global sustainable-development horizon                                                                       | 2030 Agenda                      | Links environmental, social and economic goals                    | United Nations [2]            |

*Note: Values reproduce the scope and terminology of the cited sources. GDP-equivalent health cost is a welfare estimate, not a national-accounts deduction.*

### LEGAL AND INSTITUTIONAL ARCHITECTURE

The statutory and constitutional framework in Bangladesh has meaningful foundation of environmental protection. Article 18A creates environmental protection as a leading principle of the state policy and the right to life and personal liberty has contributed to judicial concern to environmental degradation [17]. Under the Environment Conservation Act, the government and the Department of Environment has the powers to designate ecologically sensitive places, control polluting operations, demand environmental clearance and give orders [5]. The 2023 Rules have modern categorisation of projects, clearance requirements and environmental standards [6]. The Environment Court Act establishes

purpose-specific courts, but the practical scope of the courts may be constrained by reliance on procedural reports on regulation and unequal institutional access [7]. There are further requirements in sectoral legislation on forests, wildlife, water, local government, energy and urban development.

The coverage of policies is also wide. The National Environment Policy gives a context integration of the environment in sectors [8]. The Bangladesh Climate Change Strategy and Action Plan has pillars that include food security, disaster management, infrastructure, research, low-carbon development and institutional capacity [9]. The National Adaptation Plan has priorities that are medium and long term up to the year 2050 [10]. Delta Plan 2100 embraces adaptive delta management in water security, disaster risk, and ecosystems and spatial development [11]. The progression and transparency framework of the Paris Agreement and the NDC of Bangladesh support these strategies. One of the positive aspects about this architecture is its breadth: it provides a recognised mandate to the public agencies and offers civil society, courts and development partners with standards against which performance may be evaluated.

This is the weakness of vertical and horizontal integration. Environmental responsibilities are horizontally distributed between the ministry of environment, forest and climatic change, department of environment, water, agricultural, energy, industrial, transport, disaster-management and local-government [15]. Cross-sectorality does not necessarily mean that overlap is a problem. When there is no ownership of cumulative outcomes by any institution, incompatibility of data, and conflict of incentives between the projects, it becomes harmful. Authority, finance and technical capacity of the city, municipality, upazila and union levels are not always congruent with central policy vertically. The local bodies are faced with waste, drainage, encroachment of water bodies and land-use conflicts on a day-to-day basis, but they may not have expert personnel and dependable sources of revenue.

The key interface of operation is environmental clearance. A believable EIA system filters projects based on risk, scopes material impacts, option alternatives, provides a justifiable baseline, assesses cumulative and climate impacts, interacts with people, disseminates information and develops trackable approval requirements [13]. Poor EIAs can have generic descriptions, old-fashioned base-line information or poor substitutions. Dependency of the consultant may cause a conflict where the proponent has the power over information and time. Reform should thus be in the form of accreditation and professional responsibility of EIA practitioners, independent scrutiny of high-risk projects, report publicity, rational response to comments as well as post-approval compliance reporting.

The courts have been significant in enhancing environmental rights and bringing about injunctions on illegal pollution and encroachment. This has been established in public-interest litigation involving clarification that

courts can rectify failure in the administration and definition of constitutional responsibility [17]. But lawsuits are inherently discriminatory, expensive and ex-post. Routine inspection, authorizing and local planning cannot be substituted by courts. Environmental adjudication is most effective when the regulators produce strong evidence, citizens have a feeling of security when reporting violations, remedies have been provided in terms of restoration and compensation, and orders are followed through to the end. Legal empowerment, such as making complaint mechanisms available, and access of legal assistance is especially pertinent to those communities which directly rely on at risk ecosystems.

Domestic law is supplemented by international agreements[6]. Bangladesh is a signatory to the climate regime, Convention on biological diversity, Ramsar Convention, Basel Convention on hazardous wastes, Stockholm Convention on persistent organic pollutants and Minamata Convention on mercury 23. These tools establish reporting responsibilities, policy requirements and finance, technology and cooperation policy channels. They are appreciated based on domestic incorporation and application. Individual reports to be in place before international forums will not do much unless there is an association of targets with budgets, agency performance, subnational plans and open national indicators.

### **PRINCIPAL IMPLEMENTATION CHALLENGES**

The first one is credibility of enforcement. A regulatory system alters behaviour when those being regulated believe that they will be found when violating the rules and that sanctions will be stronger than the temptation to act otherwise [3]. Rare inspection, scarcity of laboratory facilities, slowness in proceedings and negotiable adherence undermines that expectation. Small businesses might also not have the funds and expertise to implement cleaner systems, and big corporations might have higher bargaining power over enforcement. The risk-based model ought to direct resources to facilities and sites where harm has the highest potential, provide continuous, or third-party validated monitoring where possible, and release compliance records. Timely prevention can be through administrative punishment, which is appropriate in cases of minor offenses, but in case of major or recurrent offenses, suspension, recovery liability and prosecution should be employed.

Institutional fragmentation is the second challenge. Project evaluation, land acquisition, utility supply, environmental approval and local authority can be done independently [4]. This structure entices agencies to maximise their respective mandate as opposed to cumulative environmental performance. Coordination committees exist frequently and can have no permanent analytical personnel, common data and power to mediate a dispute. Integration will not be achieved in the form of meetings: it will be through shared spatial datasets, shared performance indicators, shared procedures to escalate a matter and hold the cabinet to strategic results, like river health, air quality and wetland retention.

Third, environmental information is not complete and cannot be easily utilized [5]. Various organisations have monitoring stations, inspection and clearance records, pollutant-release data, land-use maps and court outcomes. Access by the masses is uneven. Absence of sound baselines would mean that agencies would be unable to tell when they are improving and when they are deteriorating or strategically enforce [6]. Opacity also dilutes market pressure since the lenders, buyers and residents cannot make comparisons by performance. Common standards, time series preservation, mapping facilities and sensitive ecosystems, and public dashboards as well as secure regulatory analytics should be applied by a national environmental data platform. Both data quality assurance and privacy protection are needed, although not to the extent of interfering with the release of information about the environmental risk to the population.

Fourth, political economy may supersede official security. The conversion of land, construction, energy and industrial activities generate concentrated benefits to the former and the environmental costs are spread across communities and generations [7]. Clearance or inspection may be affected through regulatory capture, informal payments and political interference. Discretion can be minimized through conflict-of-interest regulations, disclosure of the reasons of approval, random assigning of inspectors, electronic audit trails and independent review [8]. Whistle-blowers and environmental defenders should also be afforded protection. Environmental procedures should be designed to incorporate anti-corruption, as opposed to being another ethics programme.

Fifth, finance is off track. The agencies might be allocated small resources compared to their mandates and unhealthy practices might enjoy low-cost land, energy or credit without having to pay the cost of pollution wholly. On the other hand, cleaner technology may be costly to acquire initially and may have unpredictable payback [9]. The polluter-pays principle and transition assistance should go hand in hand. Internalisation of damage can be through pollution charges, restoration bonds and differentiated fees; concessional green credit, tax incentives and technical services can assist viable firms in complying. Climate and biodiversity risk screening should be part of public finance, and demand should be generated by procurement to purchase efficient and low-toxicity and recyclable products [10].

Sixth, it is often latitudinal and formalistic. Communities are provided with technical documentation following major decisions that are made, in a language that they cannot easily understand or even no indication as to how their comment will influence approval [11]. Women, informal settlement and livelihood groups can be left out despite causing different effects on them. Serious involvement starts in scoping, gives non-technical summaries and information in local languages, captures dissent, justifies decisions and carries on with monitoring [12]. The systems of grievance should be free enough to investigate and should safeguard the complainants against retaliation.

Lastly, climate uncertainty is an obstacle to traditional planning. The infrastructure built with the help of historical averages will not work under the conditions of future rainfall, heat, salinity or sea-levels. There is also a possibility that the ministries can imitate adaptation projects or focus on visible structures instead of maintenance and social resilience [13]. Adaptive management is thus fundamental: decisions must be made on the basis of scenarios, be flexible, track thresholds and allow one to revise strategies as evidence evolves. The reasoning already found in Delta Plan 2100 ought to be applied to sector budgets and local land-use plans [11].

### **OPPORTUNITIES FOR A GREEN AND RESILIENT TRANSITION**

When regulation, finance and industrial strategy are aligned, environmental pressures within Bangladesh can become the drivers of innovation. Short term possibilities are renewable energy and energy efficiency [23]. Solar systems will increase access and limit exposure to fuel, and rooftop solar on industrial and commercial buildings can utilize existing surfaces in proximity to demand. Emissions and operating costs can be reduced through grid modernisation, storage, energy audit, efficient motors, boilers and cooling. According to the International Renewable Energy Agency, policy surety, grid willingness, availability of capital and skilled workers are needed to convert renewable potential into action [24]. Just transition must involve training of workers and affordability to the low-income households instead of focusing the benefits on the possession of assets.

It is also significant that green industrialisation will be considered as the level of resource efficiency and viable environmental performance is becoming a key determinant of the competitiveness of Bangladesh with regard to exports. Cleaner production consumes less water, chemicals, energy and waste per unit production. The collective effluent treatment may be used to serve the high density of industries should governance, metering and liability be made explicit; otherwise, collective facilities may turn to be unaccountable. Buyer confidence can be enhanced through environmental management systems, chemical traceability and verified disclosure. The policy ought to recognize performance that is measured as opposed to equipment purchase on its own since the installed but non-operating treatment plants do not provide a benefit to the environment.

The measures of the circular economy can convert waste into a material resource instead of being a liability in the city. Extended producer responsibility places on producers operational or financial responsibility on the post-consumer products and packaging. Deposit-return systems have the potential to enhance high-value material collection. Repair, remanufacturing and industrial symbiosis decrease the demand of imported materials and generate jobs. The transition must recognise the existing contribution of informal recyclers. They can enhance safety by formal contracts, protective equipment, minimum standards of service and social protection without destroying livelihoods. Basel Convention has

offered a valuable global system of regulating the movement of hazardous wastes and eco-friendly systems [21].

Nature solutions are cheaper and more resilient when they guard existing ecosystems instead of employing green terminology to construct traditional buildings. The restoration of mangroves can decrease the coastal wave energy and sustain fisheries; urban wetlands can sustain stormwater; river and canal restoration can enhance drainage; and agroforestry can defend soils and diversify income. Engineered infrastructure should be used to complement, but not necessarily to substitute, such measures. The location should be ecologically acceptable, and long-term maintenance and rights to land and resources should be honored. The IPCC concludes that the effectiveness of ecosystem-based adaptation has potential benefits of biodiversity and livelihoods, but the effectiveness depends on location and the amount of warming [20].

One more area that can be integrated is agriculture. Salinity-resistant plants, effective irrigation, management of soil health, diversified agriculture, climate knowledge, and better storage may develop resilience without putting a strain on land and water. The use of excessive fertilizers and pesticides must be dealt with by extension, via integrated pest management and measures based on measured practice. The policy of fisheries and aquaculture should safeguard the quality of water, breeding environment and small-scale users. These should be co-designed with farmers, most so women, who in most cases have the local knowledge and yet are less secure to land titles, credit, and extensions.

These transitions can be hastened by green finance. Sustainable finance policies and green banking initiatives formulated by Bangladesh Bank offer a platform in which environmental risk management can be addressed [25]. The following is the enhancement of taxonomy integrity, project preparation and verification of outcomes. A green loan ought to exhibit extra and quantifiable environmental advantage. Banks should have sector-specific risk facilities, and smaller companies should have technical support to develop bankable projects. Blended finance, sovereign or municipal green bonds, guarantees and climate funds can raise funds to invest in public infrastructure, but it is essential to be transparent in their selection and reporting.

Responsibility can be enhanced by digital technology. Satellite imagery, remote sensors, low-cost sensors, mobile reporting, and electronic permitting can help to discover pollution and land-use variance faster. Digital systems are to develop audit trails between application and verification and enforcing. They must not automate feeble rules or isolate those who are not connected. Open standards and human review, as well as independent calibration, are needed. Public dashboards can help to transform technical monitoring into indicators that are comprehensible and allow universities and civil society to detect anomalies.

An opportunity still exists to have regional and international cooperation especially in the case of transboundary rivers, air pollution, climate finance, technology transfer and disaster forecasting. The damage to the

environment knows no boundaries and the adaptive capacity of Bangladesh is influenced by actions taken in other countries. Paris Agreement has identified finance, technology and capacity support of developing countries [12]. By connecting international offers with clear national priorities, quantifiable results and social good, Bangladesh can reinforce his/her positions. It makes sense to provide credible implementation in the home which enhances the credibility of claims to equitable international assistance.

### **INTEGRATED REFORM AGENDA**

Reform agenda must start with transformation of environmental protection to an enforceable state of both the public and private investment. SEA should be applied to all key policies, plans and programmes that have material environmental implications, prior to final approval. Project EIAs must then work within such strategic limits. Alternatives, such as demand management, alternative location and the choice not to proceed should also be evaluated [3]. The independent technical review of high-risk reports should be stated and the decision of clearance should include the description of evidence and public comment being taken. Conditions of compliance must be particular, time based and tied to monitoring indicators.

Institutional reform must demystify accountability by not making it seem that one agency can be held in charge of all environmental matters. Cross-government outcomes should be established by a permanent high-level coordination mechanism, whereas a professional secretariat is keeping common data, following up on implementation and solving mandate conflicts [6]. The regulated economy scale demands the department of environment to be staffed, have laboratories, inspection technology and legal support. The local governments need environmental officers or joint regional services, predictable budget and power to deal with garbage, drainage, water bodies and local land-use control. Central transfers need to be linked to the performance agreements that involve transparent service and environmental indicators.

There should be a graduated but definite enforcement. Light, first-time non-compliance can be a reason to impose corrective orders and technical support; recurrent, hidden or harmful violations are usually responded with increasing punitive measures, duty to restore and prohibition. Where possible pollution charges must be based on load and toxicity [10]. Remediation and community loss should be part of the cost of environmental liability and activities that can impose expensive damage should be assured. Plans of inspection and compliance position should be open, with all the proper protection of justifiable confidential data.

Monitoring, permits, EIAs, inspection, land-use and enforcement data should be incorporated in a national environmental information system. A public profile with the clearance status, major pollutants, summaries and enforcement history should be provided on each high-risk facility [3]. The cumulative conditions and not just facility level compliance should be

shown on river-basin and airshed dashboards. Quality assurance can be assisted with the help of universities and accredited laboratories. Annual environmental performance reports comparing the results with the targets and why remedial action is taken should be submitted to parliament, audit institutions and the public.

Finance reform must eliminate conflicting incentives and mobilise green investment. To increase the climate and environmental budget tagging to the outcome evaluation, the Ministry of Finance can further develop the allocation tracking to outcome evaluation [14]. Ecosystem services and future climate risk should be appreciated in the public investment appraisal. Bank and capital markets ought to use plausible sustainable-finance taxonomies and report portfolio environmental-risk exposure. Green fiscal policies must include a mixture of fees on pollution and loss of resources as well as special encouragement of cleaner technologies, retraining of workers and low-income earners. Web based project pipelines should be used in channelling international climate finance through independent evaluation.

Engagement and equality should be considered as working conditions. None of the EIA notices and non-technical summaries should be kept confidential and published online, and locally in Bangali, with the accessible forms where needed [15]. Early consultation should also be consulted to alter design. Monitoring by the community can be used to supplement official inspection, yet the government should be in charge of enforcement. Both environmental and ordinary courts require the prompt scientific assistance, case-management systems and mechanisms to control adherence to orders. There should be access to legal assistance and low-cost complaint channels to enable aggrieved communities to seek redress. It should be implemented in a sequenced manner. In the initial two years, the government must define the common data architecture, issue obvious clearance reports, embrace risk-based inspection, establish conflicting requirements and pilot SEA within sectors with high impacts [16]. In three-five years, the reforms must increase continuous monitoring, producer responsibility, local environmental services, and restoration finances and climate-resilient public investment standards. Environmental outcomes, such as cleaner air and rivers, retained wetlands, lower resource intensity, less climate loss, and equitable access to benefits of environmental quality, should be used to measure progress over a longer timeframe, as opposed to the volume of policies produced.

**TABLE 2. IMPLEMENTATION MATRIX FOR ENVIRONMENTAL GOVERNANCE REFORM**

| Priority reform                        | Lead actors                    | Primary instrument                           | Illustrative indicator                                |
|----------------------------------------|--------------------------------|----------------------------------------------|-------------------------------------------------------|
| Transparent , risk-based environmental | MoEFCC; DoE; sector ministries | Revised EIA/SEA procedures and public portal | % high-risk EIAs independently reviewed and disclosed |

| Priority reform                         | Lead actors                                                       | Primary instrument                                              | Illustrative indicator                                        |
|-----------------------------------------|-------------------------------------------------------------------|-----------------------------------------------------------------|---------------------------------------------------------------|
| clearance                               |                                                                   |                                                                 |                                                               |
| Integrated environmental data           | DoE; statistics and mapping agencies; local government            | National environmental information system                       | Monitoring coverage, timeliness and open datasets             |
| Credible enforcement and restoration    | DoE; environmental courts; local authorities                      | Graduated penalties, restoration orders and financial assurance | Repeat-violation rate and proportion of damage restored       |
| Green industrial transition             | Industry and finance ministries; Bangladesh Bank; industry bodies | Performance-linked finance and cleaner-production standards     | Energy, water and pollution intensity per unit of output      |
| Circular materials management           | Local government; producers; regulators                           | Extended producer responsibility and source separation          | Collection, reuse and safe-recycling rates                    |
| Climate-resilient local planning        | Planning bodies; local government; disaster and water agencies    | Risk-informed plans and capital budgets                         | % major investments screened against future climate scenarios |
| Environmental justice and participation | DoE; courts; local authorities; civil society                     | Early consultation, disclosure, grievance and legal aid         | Resolution time and participation of affected groups          |

## DISCUSSION

The results indicate that the issue of the environment in Bangladesh is most effectively interpreted as an implementation problem, as well as a political-economy problem, in an ever more complete normative context. Further laws will not answer pollution when the permits are black, the monitoring is sporadic and penalties are evasive [17]. On the other hand, a restricted enforcement will not be effective in situations where the firms do not have viable technology, infrastructure or finance. Good governance should be an integrated platform of plausible regulations and transition aids, information and market rewards. This combination is the reason why

the green industrial policy and environmental regulation must be structured in unison.

The analysis confronts the notion as well that environmental safeguards automatically slow down development. Weak safeguards often merely redistribute, but do not eradicate, costs [18]. Pollution is turned into illness, and lost labour; filling wetlands into waterlogging; unsafe construction is turned into disaster loss; destruction of ecosystems is turned into increased spending on engineered protection. Preventive assessment can raise early-development time of projects, yet alleviate legal conflict, stranded assets and remediation costs. The comparison that has economic significance is of the full lifecycle costs of alternative pathways, rather than regulated and unregulated construction expenditure. The second inference is that both climate adaptation and pollution control could not exist as distinct areas [19]. A contaminated canal cannot drain urban areas well; damaged mangroves lead to less protection of the coasts; the exposure to heat is exacerbated by the loss of urban green areas; poverty due to environmental disease narrows the ability to cope with climatic disasters. There are various benefits and trade-offs that should be screened in investments. As an example, an embankment can alleviate exposures to flooding but also disturb sediment, fisheries or drainage when poorly constructed. Complementary ecosystem and engineering measures can be found by integrated appraisal.

Third, legitimacy is a crucial factor to sustainable development. When the gains and losses are visible and evenly shared, communities will be willing to go through hard times [20]. People in the contaminated industries should have a way of moving to less polluting jobs; low-income families should be insulated against retrogressive prices; and the displaced should have a tenure of land, restitution of livelihoods and compensation. Participation is hence not just a right but also source of local knowledge and durability of implementation. Bangladesh is not bound by the Aarhus Convention but its third pillar of information, participation and justice offers a good governance model [26].

Lastly, global obligations are the most desirable when they transform national budgeting and accountability [21]. Aligning ministries and gaining support through the SDGs, Paris Agreement and biodiversity framework can be achieved, yet reporting must not be made an additional administrative task. Goals must be converted into industry limits, regional plans, purchase regulations and yearly performance indicators. The KunmingMontreal Global Biodiversity Framework focus on the importance of ecosystem restoration, spatial planning and finance applies to the wetlands, forests and coastal regions of Bangladesh. The Sendai Framework also associates the disaster risk reduction with governance, investment and preparedness [28]. These frameworks together help in an integrated, as opposed to project fragmented, approach.

### **Monitoring and Evaluation Framework**

Such a large-scale reform programme must have a monitoring framework that can separate administrative action and environmental change. Inputs include budgets, staff, laboratories and monitoring equipment. Examples of outputs would be inspections made, release of permits, consultations and enforcement orders carried out. Outcomes are changes in compliance, pollutant loads, ecosystem condition, exposure and resilience [22]. The government reporting usually focuses on the inputs and outputs since they are relatively easy to measure but sustainable development requires results. The increase in inspections should not lead to a better air quality by the ministry where low-risk areas are inspected or corrective orders not implemented. Indicators are then to be structured in a results chain and audited on a regular basis.

Environmental indicators are also required to be disaggregated both spatially and socially. A national gain can shield the deterioration within a specific industrial region, seaside resorts or slum. Exposure to air and water in the surroundings of schools, hospitals and high residential places should be detected. Where ethically and practically feasible, climate-loss data must capture: gender, age, disability, livelihood and tenure[23]. Disaggregation ensures environmental justice is seen and leads to resources being directed to areas at highest cumulative risk. It also avoids the situation in which green investment is considered on the basis of aggregate tonnes of emission avoided with no evaluation of displacement, affordability or livelihood effects.

The cycle of reporting should be institutionalized in learning. All major programmes are supposed to identify assumptions, risk levels and circumstances that would warrant redesign. Independent assessment should look beyond ascertaining whether a project brought about assets, but whether these assets worked, were maintained and mitigated vulnerability. Results ought to be incorporated to the budgetary allocation and subsequent clearance decision [24]. Upon failure being detected by monitoring, the agencies must be mandated to post a corrective-action plan instead of considering evaluation to be an archival practice. The method is aligned to adaptive management and is especially crucial when there is an evolution of climate projections and technological conditions.

The framework can be strengthened by parliamentary control, civic and civic audit. A report should have a limited number of stable national indicators, basin, city and district profiles presented as a state-of-the-environment report annually [25]. The report ought to be a description of tendencies, data constraints, unmet objectives and how the authority concerned reacted to it. The underlying non-sensitive data should be downloadable to civil society and research institutions and recreate headline findings. An official government reaction to independent scrutiny would close the process of accountability. In the long run, predictable disclosure may enhance the discipline of the administration, the quality of research and investor trust and minimize the controversy around the reality of the state of the facts on the ground.

## CONCLUSION

The success of Bangladesh in development and its vulnerability to the environment are not opposing accounts rather they are a component of the same transition. Industrialisation, urbanisation and infrastructure have made living better, yet these changes are only sustainable due to clean air and water, well-adapted ecosystems, climate resilient settlements and legitimate institutions. The nation already has a constitutional guidance, principle environmental laws, policy tools together with specialised and a wide range of international commitments. The critical challenge is to ensure they are operationalized in the areas of investment, land use, industrial production and the provision of local services.

The paper concludes that poor enforcement, disjointed institutions, insufficient data, local capacity and political interference as well as financing and limited participation, the legal-policy framework fails to result in the same outcomes in a consistent manner. These shortcomings interact: inadequate data undermines enforcement; inadequate participation hides domestic abuse; disjointed financing incentivizes projects without taking ecological cost into consideration; and poor remedies decrease deterrence. Reform should thus be systematic. Isolated training, a new committee or another strategy document will not be sufficient.

A plausible trajectory is an integration of preventive evaluation, risk-controlled regulation, open information, coordinated agencies, environmental justice and green economic policy. Renewable energy, efficient industry, circular material systems, nature-based adaptation, sustainable agriculture and green finance will generate employment and resilience and decrease environmental pressure. Their advantages will be based on integrity: green labels should reflect quantifiable results, projects related to the ecosystem should not limit the rights of the local population, and transition costs should not be forced on the poorest.

Whether national prosperity can be sustained without imposing on the vulnerable communities, the neighbouring jurisdictions or future generations, the transfer of unacceptable harm, should be the ultimate measure of sustainable development. In the case of Bangladesh, this needs to make environmental protection a binding aspect of development quality. It is upon the decisions of the country to predetermine the amounts of money that may be invested in any particular market and engage the community in the process of making such decisions that the country can save unnecessary loss, enhance competitiveness and establish a safer social base to the long-term prosperity.

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