



# BANGLADESH NATIONAL CONSERVATION STRATEGY



## MONITORING & COORDINATION MECHANISM FOR NCS IMPLEMENTATION

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S M MUNJURUL HANNAN KHAN



## INTRODUCTION

Establishing environmental monitoring mechanism is essential for ensuring safeguard to environment for maintaining its goods and services to sustain development. Economic development often shifted national priority towards economic planning without giving proper attention to environmental aspects. Environmental monitoring must be embodied in the economic development agenda for retaining sustainability in economic development. Monitoring mechanisms are effective tool for following progress of development initiatives and provide guiding outline to improve implementation approach. Therefore systematic approach to environmental monitoring mechanism in all development activities is critical for achieving Sustainable Development.

Sustainable Development Goals (SDGs) are adopted in September, 2015, the world leaders adopted the 17 Sustainable Development Goals (SDGs) (Fig. 1), which officially entered into force on January 2016, at the UN summit. The SDGs, which were built on the Millennium Development Goals (MDGs), aims to transcend further than the MDGs by undertaking initiatives to address all forms of poverty, environmental management, climate change and so on. Though the SDGs are not legally binding for any countries however; the governments are expected to undertake ownership and build a national framework to achieve the 17 Goals. Bangladesh, among the 193 countries, has ratified the SDGs.

Moving towards the goals of the sustainable development require effective monitoring mechanism which would facilitate to keep track of the progresses made and hence undertake effective decisions, measures and policies. The national agencies need to use modern technology like GIS and remote sensing to facilitate monitoring of development progress as well as to keep track of any changes that need special measure to maintain steady progress in the development initiatives.

**Fig. 1 Sustainable Development Goals**

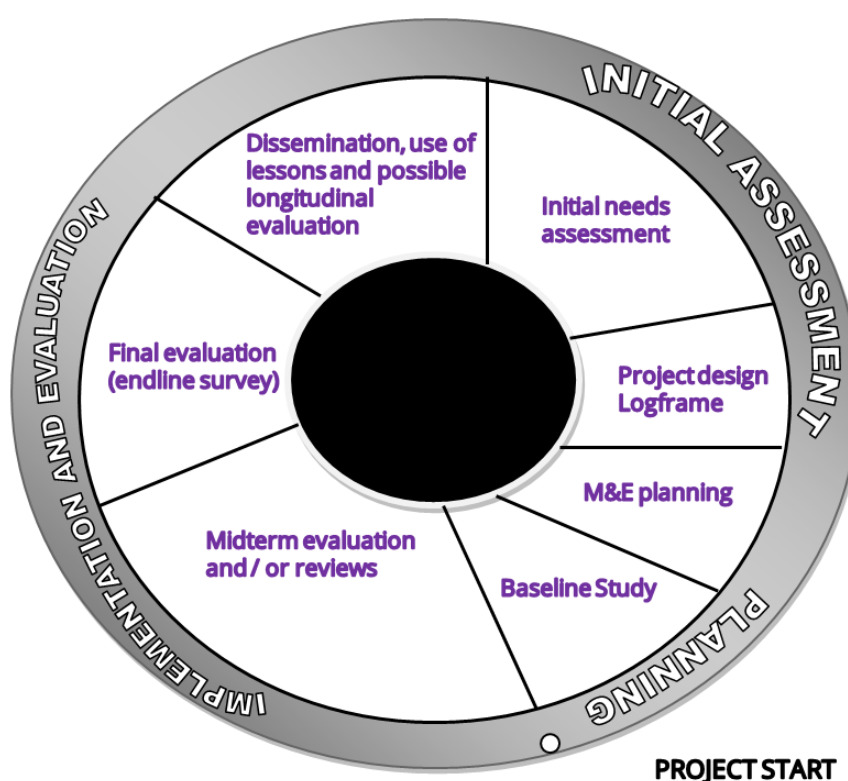


An effective indicator would also facilitate to determine the progress towards achieving Sustainable Development Goals (SDG) at the local and national level. Primary initiatives have been started by GOB (Planning Commission) to foster the monitoring activities through decentralization of the responsibilities among ministries and department. However, this initiative needs to be strengthened by developing a robust environmental monitoring framework to follow up implementation progress of SDGs.

## ENVIRONMENTAL MONITORING MECHANISM-CONCEPTUAL FRAMEWORK

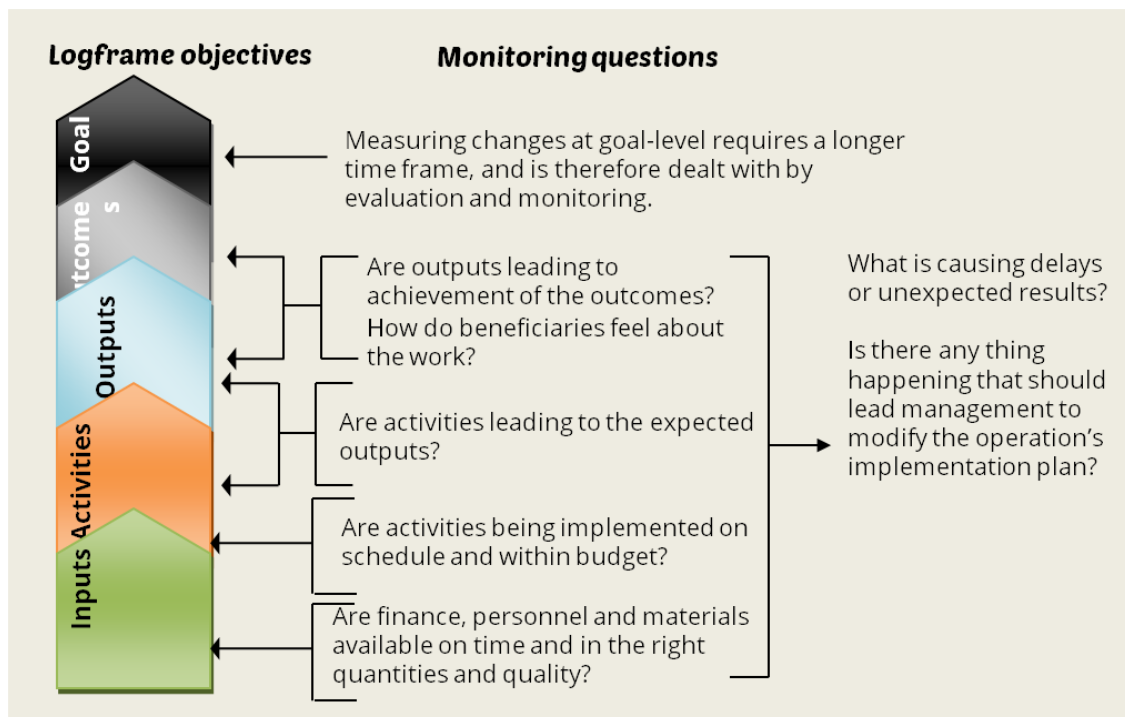
Environmental monitoring emphasize on the environmental setting of ecosystems that are under any development initiative. Monitoring mechanism essentially captures data and information on the status and impacts on overall environment management due to development activities. Environmental monitoring is to conduct sampling of air, water, soil and biota systematically with the intention of studying and observing the environment and in the process obtain knowledge (Artiola et al. 2004). Environmental monitoring is being undertaken for various purposes which includes to set up “environmental baseline, trends and cumulative effects”, to explore environmental modeling processes, to provide education to the public about the condition of the environment, to inform “the policy design and decision-making”, to ensure that the environmental regulations are being complied, and to evaluate anthropogenic impacts or influences (Mitchell, 2002). However, a well designed monitoring system has to be developed based on the above mentioned criteria to contribute effectively in sustainability needs of the development initiatives.

**Diagram 1: Key M & E Activities in the Project Cycle**



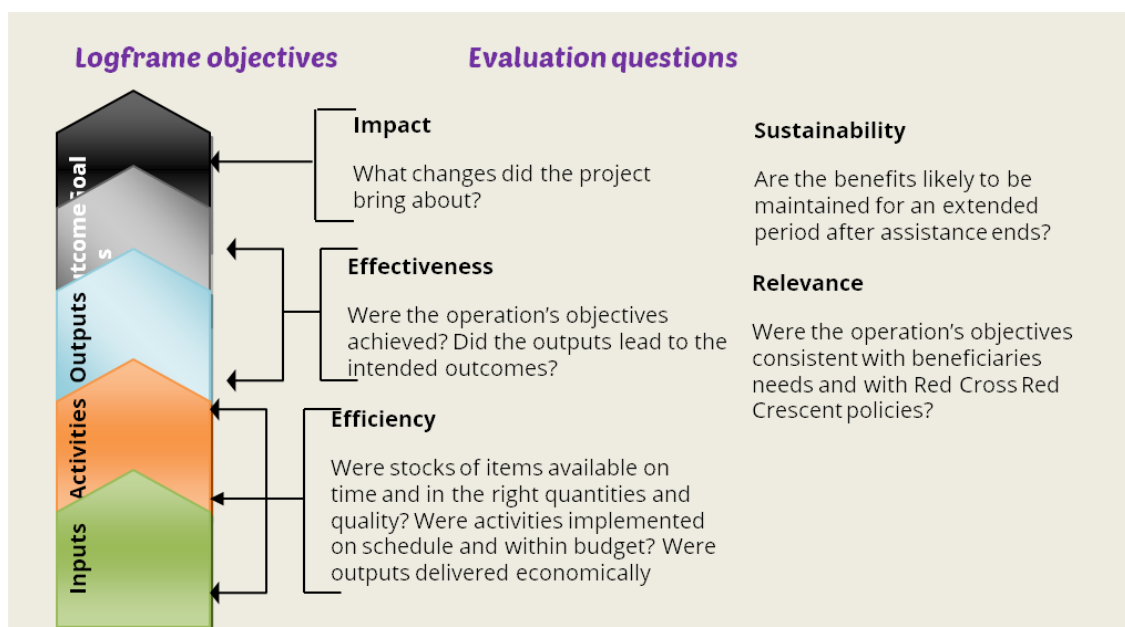
The above Diagram 1 has indicated key activities (planning, monitoring, evaluation and reporting) in the project cycle to ensure effective monitoring and evaluation system for achieving goal of any project. However, there is no generic project/program cycle, as each project/program ultimately varies according to the project objective and the local context. Diagram 2 and Diagram 3 have shown the linkages of Monitoring questions and Logframe objectives and Evaluation questions and Logframe objectives respectively.


**Diagram 2: Monitoring Questions and the Logframe**



Source: IFRC-ME-Guide

**Diagram 3: Monitoring Questions and the Logframe**





These linkages are very critical to undertake effective M & E development project. From conceptual point of view M & E team must have full understanding of Logframe objectives and M & E questions. Diagram 2 and 3 will provide theoretical perspective of M & E and Logframe objectives (mostly on the lower level objective) to design a M & E system for development project/program.

## ENVIRONMENTAL MONITORING PROTOCOL: BANGLADESH CONTEXT

Bangladesh made commendable progress in monitoring of development projects and programmes within a set of standard practice. Basically every ministry and department have planning cell to take care of project/programme monitoring including project/programme development and implementation. Apart from this, Internal Monitoring and Evaluation Division (IMED) of the Planning Ministry regularly carried out monitoring and evaluation of the existing projects/programmes to monitor development progress while implementing and after completion of the projects/programmes. Existing monitoring system is basically looking at the development progress of the projects/programmes during and after the initiatives. Ministries, departments and IMED are not necessarily focusing their monitoring on environmental issues and hence environmental monitoring remains unfocused while conducting development progress monitoring. Commitment of the GOB to implement the SDGs would require new set of criteria to establish monitoring to follow up progress of the SDGs implementation. The following points are important to consider for developing a systematic approach on environmental monitoring of the SDGs.

- i) Relevant ministries and departments should have understanding of the milestone while implementing the SDGs. Based on national circumstances, relevant ministries and departments should have strategic plan for SDGs implementation with a set of criteria on the approach of environmental monitoring system. In this process, Planning Commission must play a vital role to guide all relevant ministries and departments to establish protocol for environmental monitoring during and after SDGs implementation.
- ii) Every ministry and department must develop their environmental monitoring plan emphasizing on environmental issues while implementing the SDGs. Monitoring plan must encompasses the ground level environmental monitoring to be sure on the status and impacts on the environment. An example of a monitoring plan is given for better understanding and usefulness of the plan (Table 1.1, 1.2 and 1.3).
- iii) Strengthening of Project Steering Committee (PSC) and Project Implementation Committee Implementing (PIC), which are existing setting to monitor the projects by the ministries, must monitor environmental aspects of development projects while these committees are looking at the administrative and financial aspects of the projects. These committees must have scope to see the SDGs implementation under development activities and be responsible for environmental monitoring.
- iv) Multi-sectoral involvement of SDGs implementation requires focused coordination among all relevant stakeholders. Both horizontal and vertical linkages of institutions must be establish for effective environmental monitoring



## MONITORING PLAN

The following example of monitoring plan will provide an idea of drafting monitoring plan for different project. These tables are providing critical elements of monitoring plan and how monitoring plan will be designed by considering indicator, data collection procedure and responsible institution. Three monitoring plans such as i) Physical Environmental Monitoring Plan ii) Land and Agriculture and iii) Ecosystem Monitoring Plan are sighted to have an idea of designing such plan while developing monitoring protocol for development activities.

**Table: 1.1 Physical Environmental Monitoring Plans**

Indicator	Location of data collection	Frequency of data collection	Institution (s)
<b>Physical Environment Monitoring Plan</b>			
<b>Construction</b>			
Monitoring EMP implementation <ul style="list-style-type: none"> <li>• Mitigation measures</li> <li>• Enhancement measures</li> <li>• Contingency</li> <li>• Compensation</li> </ul>	Project site	Daily monitoring and documenting and quarterly reporting	BPDB/Contractor/EPC Contractor
Respiratory Particular matter (PM <sub>2.5</sub> and PM <sub>10</sub> )	Four Samples from four edges of the project boundary. One sample from 1km downwind from the project boundary.	Quarterly	BPDB/Contractor/EPC Contractor
Noise	One noise level data from middle of the project boundary. four data from four different locations- <ul style="list-style-type: none"> <li>• 1 km away from south boundary</li> <li>• 1 km away from north boundary</li> <li>• 1 km away from east boundary</li> <li>• 1 km away from west boundary</li> <li>• Sherpur Bazar point</li> </ul>	Quarterly	BPDB/Contractor/EPC Contractor
Waste generation <ul style="list-style-type: none"> <li>• Construction</li> <li>• Domestic</li> </ul>	Project area and labor shed	Quarterly	BPDB/Contractor/EPC Contractor
Implementation of on-site waste management	Within project area	Weekly Monitoring and Reporting	BPDB/Contractor/

**Table: 1.2 Land and Agriculture Monitoring Plan**

<b>Land and Agriculture Monitoring Plan</b>			
Land use	Inside and outside the project	3 (three) Months	DAE and BPDB
Sub soil	Inside and outside the project	Yearly	SRDI & BPDB
Crop production	Inside and outside the project	4 (four) Months	DAE and BPDB
Crop damage	Inside and outside the project	4 (four) Months	DAE and

**Table: 1.3 Ecosystem Monitoring Plan**

<b>Ecosystem Monitoring Plan</b>			
<b>Construction</b>			
Bird colony, feeding and nesting ground	Within 10 km radius of the project	Quarterly	BPDB/DoE
Limiting of vegetation clearance	Within project area	Daily during base stripping activities	BPDB/DoE
Dolphin activities	Kushiyara River adjacent to project area	Quarterly	BPDB/DoE
Implementation of Ecosystem management plan	Within project area	Regular monitoring and quarterly reporting	BPDB/DoE
<b>Pre-construction</b>			
Bird colony, feeding and nesting ground	Within 10 km buffer of the project	Quarterly	Contractor/DoE
Ecosystem health of the surrounding: <ul style="list-style-type: none"> <li>Plant health</li> <li>Productivity of fruiting plants</li> </ul>	5 samples from homestead ecosystem (at least 2 at down wind direction) within 5 km radius area 5 samples from road side plantation including 2 at downwind direction within 5 km radius area	Quarterly	BPDB/DoE
Water quality of Kushiyara River <ul style="list-style-type: none"> <li>Oil</li> <li>pH</li> </ul>	Jetty location of project site	Quarterly	DoE, Contractor

Monitoring plan must consider development project period while designing key M & E activities. Depending on total time of project, M & E activities need to be articulated in the plan. However the following Box 1 has shown how variations of time period are linked with M & E activities.

### Box 1: Examples of key M&E Activities

Emergency relief project	One-year recovery project	Four-year development project
<ul style="list-style-type: none"> <li>→ Baseline study (from FACT before implementation )</li> <li>→ Project (results, activity, financial monitoring</li> <li>→ Context monitoring</li> <li>→ Beneficiary monitoring</li> <li>→ Real-time evaluation (month 4)</li> <li>→ Regular operation updates</li> <li>→ Final evaluation</li> </ul>	<ul style="list-style-type: none"> <li>→ Baseline study from initial assessment</li> <li>→ Project monitoring</li> <li>→ Context monitoring</li> <li>→ Beneficiary monitoring</li> <li>→ Six-month project review</li> <li>→ Regular operations updates</li> <li>→ Final evaluation</li> </ul>	<ul style="list-style-type: none"> <li>→ Baseline survey</li> <li>→ Project monitoring</li> <li>→ Context monitoring</li> <li>→ Beneficiary monitoring</li> <li>→ Mid-year report, programme update, annual report</li> <li>→ Mid-year and/or annual reviews</li> <li>→ Two-year midterm evaluation</li> <li>→ Independent final evaluation (with endline survey)</li> <li>→ Ex-post evaluation</li> </ul>

## SOCIAL DEVELOPMENT GOALS: ENVIRONMENTAL MONITORING AND EVALUATION OF DEVELOPMENT PROGRAM AND PROJECTS

After MDGs, SDGs become new set of goals for attaining sustainable development in developing countries. In order to achieve specific SDG, there are indicators to monitor and verify the actual achievement of each goal. The following Table 2 underlined relevant indicators, responsible institutions, process and use to be considered while environmental monitoring protocol would be developed for development program and project. Based on the nature of development program and/or project environmental monitoring protocol must be adjusted with indicators to evaluate the results.





**Table 2: Relevant SDGs, Indicators and Institutions for Environmental Monitoring and Evaluation**

No	Sustainable Development Goals	Indicators	Relevant Institutions	Process and Use
1	No Poverty	a) Proportion of resources allocated directly to poverty reduction programmes. b) Proportion of total government spending on essential services (education, health and social protection). c) National and local disaster risk reduction strategies.	Ministry of Finance, Planning Commission, Sectoral Ministries, Sectoral Divisions and Departments, Ministry of Disaster Management and Relief, Department of Disaster Management	Decrease pressure on natural resources  Social safety net program
2	Zero Hunger	a) Volume of production per labour unit by classes of farming/pastoral/forestry enterprise size. b) Proportion of agricultural area under productive and sustainable agriculture. c) Number of plant and animal genetic for food and agriculture secured in either medium or long term conservation facilities.	Sectoral Ministries, Divisions and Departments, Planning Commission, IMED	Agriculture production and food security
3	Good Health and Well-being	a) Number of people requiring interventions against neglected tropical diseases	Ministry of Health and Family Planning, Planning Commission, Ministry of Disaster Management and Relief, Relevant departments, IMED	Health security
4	Quality Education	a) Extent to which education for sustainable development, including gender equality and human rights, are mainstreamed at all levels in: a) national education policies b) curricula c) teacher education and d) student	Ministry of Education, Ministry of Environment and Forests (Environmental education)	Knowledge Management

		assessment.	Department Environment  IMED	
5	Gender Equality	a) Proportion of total agricultural production with ownership or secure rights over agricultural land by sex; b) share of women among owners or right bearers of agricultural land, by type and tenure. b) Proportion of countries where the legal framework (including customary law) guarantees women's equal rights to land ownership and/or control.	Planning Commission  Ministry of Land,  Ministry of Agriculture  Ministry of Women and Children Affairs  IMED	Gender Empowerment and sustaining development
6	Clean water and sanitation	a) Proportion of population using safely-managed drinking water services. b) Change in water-use efficiency overtime. c) Level of water stress: freshwater withdrawal as a proportion available freshwater resources. d) Degree of water resources management implementation (0-100). e) Amount of water and sanitation related official development assistance that is part of a government-coordinated spending plan.	Ministry of Local Government , Cooperatives and Rural Development,  Department Public Health Engineering,  WASA,  City Corporations,  Municipalities  Planning Commission  IMED	Health security and safety
7	Affordable and clean energy	Investment in energy efficiency as a percentage of GDP and the amount of direct of foreign direct investment in financial transfer for infrastructure and development to sustainable development services.	Ministry of Power, Energy and Mineral Resources,  Power Division,  SREDA  Planning	Access to clean energy to all

			Commission IMED	
9	Industry, Innovation and infrastructure	a) CO <sub>2</sub> emission per unit of value added.	Ministry of Industry  Ministry of Environment and Forests  Department Environment	Mitigation to climate change
11	Sustainable cities and communities	b) Proportion of local governments that adopt and implement local disaster risk reduction strategies in line with the Sendai Framework for Disaster Risk Reduction 2015-2030.	Ministry of Disaster Management and Relief  Department of Disaster Management	Shelter and sustainable housing
13	Climate action	a) Number of countries that have communicated the establishment or operationalization of an integrated policy/strategy/plan which increases their ability to adapt the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emission in a manner that does not threaten food production (national adaptation plan, NDC, national communication, biennial update report and other.	Ministry of Environment and Forests  Department of Environment  Bangladesh Climate Change Trust  Forest Department	Adaptation and Mitigation action to impacts of climate change
14	Life below water	a) Proportion of fish stocks within biologically sustainable levels. b) Coverage of protected areas in relation to marine areas. c) Progress by countries in the degree of implementation of international instruments aiming to combat illegal, unreported and unregulated fishing. d) Sustainable fisheries as a percentage of GDP in small island developing states, least developed countries and all countries.	Ministry of Fisheries and Livestock  Department of Fisheries	Resource conservation

15	Life on land	<p>a) Forest area as a proportion of total land area.</p> <p>b) Proportion of important sites for terrestrial and freshwater biodiversity that are covered by protected areas, by ecosystem type.</p> <p>c) Progress towards sustainable forest management.</p> <p>d) Proportion of land that is degraded over total land area</p> <p>e) Coverage by protected areas of important sites for mountain biodiversity.</p> <p>f) Official development assistance and public expenditure on conservation and sustainable use of biodiversity and ecosystems</p> <p>g) Proportion of traded wildlife that was poached or illicitly trafficked.</p>	<p>Ministry of Environment and Forests</p> <p>Forest Department</p> <p>Planning Commission</p> <p>IMED</p>	Forest and Biodiversity conservation
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## MINISTRY OF ENVIRONMENT AND FORESTS: CENTRAL INSTITUTION FOR ENVIRONMENTAL MONITORING

Environmental clearance is mandatory for any development activities those have potential impacts on environment and classify as the Orange and Red categories of the Environmental Conservation Act 1995. Authority to provide environmental clearance by the MOEF does not necessarily mean that environmental monitoring of development activities will be carried out by the MOEF. Rather it is the responsibility of the implementing agency to monitor development initiatives including environmental aspects. Focusing on SDGs implementation and potential threats to environmental impacts due to economic development, GOB must have systematic institutional approach to ensure environmental monitoring. As per *Rules of Business* and *Allocation of Business* of GOB, the MOEF is responsible for safeguarding the environment of the country. Such responsibilities of the MOEF need to be translated into action and the MOEF can be designated as central ministry for environmental monitoring hub of the development activities.


While the MOEF be a central agency for environmental monitoring institution, technological support must be ensured to run their business in monitoring by using modern technology. In the mid 1960s, the applications of photogrammetry and remote sensing have increased at a moderate pace however; they were restricted to specialized national bodies. In 1990, extensive usage of the technology had begun due to the setup of smaller agencies working in different sectors in order to obtain spatial data and analysis.

However, the major agencies working in this field include the Space Research and Remote Sensing Organization (SPARRSO), Survey of Bangladesh (SOB) and Center for Environmental and Geographic Information Services (CEGIS), Bangladesh Meteorological Department (BMD) and Bangladesh Water Development Board (BWDB) (Huque, 2000). These agencies can be used as technology providing hub for conducting environmental monitoring by the MOEF.

The SPARRSO is a research and development agency working on the application of remote sensing in different sectors. Its primary objective is to employ remote sensing technology to conduct survey on the natural resources and monitor the environment and the natural hazards of the country.

The CEGIS has developed capacity building in terms of expertise, hardware and software for digital image processing, GIS analysis, building digital database, GIS modeling, differential GPS survey and meta databases. CEGIS is a scientific organization, which conducts integrated environmental analysis through employing technologies like GIS, RS, IT and databases. It provides solutions to problems in the sectors, but not restricted to, which include water, land, agriculture, meteorology, forestry, fisheries, morphology, ecology, environment, climate change, archeology, socio-economy, power, transportation and disasters. The SOB uses aerial photographs to conduct survey at the national level. However, the academic institutions such as Dhaka University, BUET, Rajshahi University and Jahangirnagar University are also be part of environmental monitoring with the MOEF, as they are offering courses on GIS and remote sensing (Huque, 2000).





From climate change point of view, Bangladesh Meteorological Department (BMD) need to be associated with the MOEF for providing support to environmental monitoring. BMD gathers meteorological information, which include evaporation, humidity, solar radiation, rainfall, sunshine hours, temperature and wind speed from 36 data collection stations located all over Bangladesh. Bangladesh Water Development Board (BWDB) gathers hydrologic information such as rainfall, water level and discharge data. In addition, BIWTA also collects water level data from 43 tidal stations. The Department of Environment and BWDB measure the salinity data in the coastal region on a regular basis however, the latter national agency measure it daily and fortnightly (IUCN, 2011).

## **BANGLADESH CONSERVATION LAWS AND STRATEGIES: IMPORTANCE OF MONITORING AND EVALUATION**

### **a) Forest and Conservation Laws**

Apart from state management of the forest resources, the Forest Act 1927 (Amended 2000) had articulated the rules of managing, improving and protecting the forest resources through assigning prescribed responsibilities to the village community. Under the said Act, the concept of social forestry programme had been established, which delegated assigned responsibilities to individual or any person, to assist the government in managing the forest land and resources. The forest Act had been established to preserve and safeguard the forest resources in both public and private areas. The said Act contains 23 important provisions regarding “constitution of reserved forest, formation of any forestland or wasteland or any land suitable for afforestation will be the property of government”. Therefore, this Act largely contributes for the conservation and development of the forest and forest resources in the country. However, such laws are not being enforced adequately due to weak and institutional shortcomings (Noor, 2013).

### **b) The Bangladesh Environment Conservation Act, 1995 and The Bangladesh Environment Conservation Rules, 1997**

In 1995, the Bangladesh Environment Conservation Act had been passed with the aim of improving, protecting and conserving the natural resources and environment. The main objectives of ECA'95 are: conservation of the natural environment and improvement of environmental standards, and control and mitigation of environmental pollution. The main strategies of the act can be summarized as:

- Declaration of ecologically critical areas, and restriction on the operation and process, which can be continued or cannot be initiated in the ecologically critical areas.
- Regulation in respect of vehicles emitting smoke harmful for the environment.
- Environmental clearance.
- Remedial measures for injury to ecosystem
- Regulation of the projects and other development activities - discharge permit.
- Promulgation of standards for quality of air, water, noise and soil for different areas for different purposes.
- Promulgation of standard limit for discharging and emitting waste.
- Formulation and declaration of environmental guidelines.



This Act has articulated the concept of ecosystem conservation and also elaborated the criteria of ecologically critical areas designation. The Act contains remedial measures to prevent any kind of injury to the ecosystem and issued penalty for non-compliance to the law. The procedures to take such clearance are in place. Failure to comply with any part of ECA'95 may result in punishment by a maximum of 10 years imprisonment or a maximum fine of Tk. 1000,000 or both.

In 1997, the environment conservation rules had been established to implement the Bangladesh environmental Conservation Act effectively. The said rules had stipulated the factors that need to be taken into consideration while declaring an area as Ecologically Critical Area under sub-section (1) of section 5 which include a) human habitat b) ancient monument c) archeological site d) forest sanctuary e) national park f) game reserve g) wild animals habitat h) wetland i) mangrove j) forest area k) bio-diversity of the relevant area l) other relevant factors (Farooque & Hasan, 2004).


The Environment Conservation Rules 1997 sets environmental standards for varying water sources, ambient air, noise, odor, industrial effluent and emission discharges, vehicular emission, etc. with the main aim of limiting the volume and concentrations of pollution discharged into the environment. A number of surrogate pollution parameters like Biochemical Oxygen Demand, or Chemical Oxygen Demand; Total Suspended Solids, etc. are specified in terms of concentration and/or total allowable quality discharged in case of waste water and solid waste. Others specific parameters are specified such as phenol, cyanide, copper, zinc, chromium, and various types of particulate, sulfur dioxide, nitrogen oxides, volatile organic compounds and other substances

These Act and Rules have been using as legal instruments to monitor ecosystems of the country as well as to prevent degradation of critical and fragile ecosystems of the country. During implementation of development projects implementation authority must take all these standards and regulatory measures into monitoring protocol to ensure safeguard of environmental integrity.

### **c) National Forest Policy, 1979, 1994 and 2016 (draft)**

In 1979, the government had formulated National Forest Policy. The said policy had provided limited scope to the people's participation in enhancing the forest resources. However, increasing demand of the forest products and subsequent depletion and degradation of the forest resources compelled the government to update and revise the policy which is known as the Forest Policy 1994. The Ministry of Environment and Forests has taken initiative to revise National Forest Policy 1994. This policy has been revised and draft National Forest Policy 2016 is available for consultation. The principal objectives of the National Forestry Policy are to:

1. Reduce forest degradation and halt deforestation, restore degraded forests and conserve environmental services, biodiversity and wildlife, promote food and water security and enhance community livelihoods to mitigate the impacts of climate change.
2. Intensify efforts to ensure that 20% of the country's area is under forests and tree cover, including 100% of state forests, 80% of hill land areas, 30% of terrain land areas, and 10% of plain land areas, by 2035 through afforestation, reforestation, social forestry, and ecological restoration and sustainable forest management programs



involving the government, conservation and natural resources management non-governmental organizations (NGOs), and the private sector in partnership with local communities.

- 3.** Enhance forest resilience through the conservation of forests and biodiversity, arresting forest fragmentation and degradation, establishing and linking forest corridors, encouraging participatory afforestation with climate resilient species, and strengthening forest resources patrolling activities by expanding the use of MIST and SMART monitoring and reporting systems and linking their applications with the actions of rapid response forest crime enforcement teams.
- 4.** Strengthen biodiversity conservation by mitigating threats and drivers of forest degradation and the loss of biodiversity and expanding and sustainably managing protected area landscapes and wildlife, including forest corridors.
- 5.** Increase contributions to revenue generation and the enhancement of local employment and income opportunities through the establishment of sustainable and profitable forest products enterprises, the development and expansion of nature- and culture-based tourism, and the optimization of carbon credit and other related sources of conservation funding.
- 6.** Promote innovative forms of collaborative, participatory forestry to increase forest productivity with positive implications on climate change mitigation, poverty alleviation and the equitable distribution of socioeconomic benefits to local communities.
- 7.** Restore and sustainably manage degraded and other marginal areas, including coastal areas and wetlands, under climate resilient, participatory afforestation, reforestation, rehabilitation and ecological restoration processes to increase carbon sequestration consistent with the production and distribution of co-benefits that contribute to meeting local community requirements.
- 8.** Launch and sustain a country-wide conservation movement by encouraging, especially, women, youth and indigenous people to promote climate resilient private tree growing and forge innovative conservation partnerships with the private sector, civil society and conservation and natural resources management NGOs to forest all forestland encroachment, impede deforestation and forest degradation, and control wildlife poaching and trafficking.
- 9.** Ensure compliance with the requirements of relevant international agreements, conventions, and protocols to which the Government of Bangladesh is a signatory and establish appropriate enabling conditions to access international funds made available under those agreements, conventions, and protocols.
- 10.** Monitor the state of forest, biodiversity and ecosystem services to provide relevant management and decision-making information required by the government and its departments and agencies, as well as by other stakeholders, through increasing manpower and the institutional strengthening of forestry research and analytical capacities and monitor the status of local community forest users and resource uses.

The National Forest Policy 2016 (draft) has articulated monitoring mechanism very effective ways. Most of the objectives of the policy emphasized monitoring of the forest resources and created opportunities for resource users to be involved in decision making process and management of forest resources. Most of the forest and forest resources are under the supervision or control of the Department of Environment and Ministry of Environment and Forests. The responsibilities of the said authorities are to protect and scientifically manage the forest environment with aim of sustaining the forest resources (Noor, 2013).



#### **d) The Environment Policy, 1992**

The government had promulgated Environment Policy, 1992 with the view to preventing the depleting nature of the environment. It contains directives for implementing the steps to conserve the environment with coordinated efforts of the government or semi-government or autonomous organizations at the national levels. The national Environment Policy 1992 includes a number of sectors including agriculture, industry, health, energy, water, land, forest, fisheries, marine, transport, housing, population, education and science. The main theme of the policy is to ensure the protection and improvement of the environment. Effective implementation of the Policy will ensure long term sustainable use of all natural resources. Also, this policy created space for amending the existing laws, formulating the new laws and implementing the same. Environmental policy of Bangladesh addressed 15 broad sectors to deal with overall environmental issues. For each of the sectors some goals and target were set and action plan to achieve targets. These goals and targets must be considered while developing monitoring mechanism in development project implementation.

#### **APPROACHES TO DEVELOP EFFECTIVE MONITORING PLAN**

Developing a monitoring framework requires to identify the existing problems that restrict effective implementation of the monitoring tools. GIS and remote sensing technology have been employed for mapping and monitoring different aspects of the environmental systems. However, there are specific issues which need to be taken into consideration in designing the monitoring system. For example, the National Flood Monitoring System (NFMS), developed by SPARRSO, is being implemented by applying GIS framework to produce flood map and flood area statistics from the satellite data. At present, the system is being operated at grade G-1 which provides the flood area map and statistics in gross term. Mapping a gross flood area (perennial and extended) would not help to provide useful information to the flood managers. When the level of flood remains at a normal level it is called perennial and when the extent of the flood level goes beyond the perennial level it is called extended flood. Mapping an extended flood area would help to undertake effective relief and rehabilitation activities (Islam et al. 2014). Application of GIS and remote sensing technology needs to be improved and proliferated in order to monitor and detect climatic variability and aberrations. Such an attempt would provide actual information regarding the affected area hence detail understanding of environmental issues during and after implementation of the projects.

Besides monitoring the environment through employment of technology, the community members can be involved in monitoring the environmental system. In the United Nations Earth Summit Agenda 21, the principle of public participation in managing the environment issues had been elaborated (UN, 1992). Globally, the concept of the community-based monitoring had gained momentum (Conrad & Daoust, 2008). The community based environmental monitoring would help to strengthen community members existing knowledge in managing the environmental sustainably. However, to implement such concept would require effective engagement of the community members during the process of monitoring. It is vital to strengthen the existing capacity building and knowledge on monitoring environmental system to implement effective monitoring mechanism. Developing an effective monitoring framework must include the following elements and its utilization while conducting environmental monitoring.



a) Design: The design take into consideration of some of the objectives of the monitoring system which include, what environmental aspects will be monitored, how the data will be applied, what indicators will be established and how the stakeholders will be integrated/involved into the system. The temporal and geographical details have to be determined-for instance, “frequency, timing, location and density of monitoring system” (Lovett et al. 2007).

b) Implementation: The parties accountable/responsible for each feature of the monitoring system is to be identified and receive training. The methods and sampling strategies are to be tested and documented. Contingency plans are being formulated to address any problems (Lovett et al. 2007).

c) Data Collection: The methods and practices to collect the data need to be established and used. The samples and the records of the data need to be documented and archived (Lovett et al. 2007).

d) Quality Control: The methods are being applied by following the standards and guidelines. “Other quality controls are in place to maintain the integrity of the data set” (Lovett et al. 2007).

e) Synthesis and analysis of the data: The data are being summarized in the form of maps or graphs. Indicators are being calculated and applied to compare in order to detect any changes (Lovett et al. 2007).

f) Internal reporting and communication: The findings generated are being passed within the organizations which are responsible for monitoring. “The data are available internally with a description of their properties and their limitations (Lovett et al. 2007).

g) External reporting and communication: The findings are being communicated to the external concerned authorities/audiences (the public, Parliament, or international bodies such as Secretariats responsible for international agreements). “Specialized users have access to detailed monitoring results (Lovett et al. 2007).

h) Audit and review of the system: Audits and evaluation are being undertaken in order to examine whether it is fulfilling the objectives, and to discover opportunities for improvements (Lovett et al. 2007).

The following M & E Framework Template will help to design and conduct M & E of development project/program.

### **Monitoring & Evaluation (M&E) Framework Template**

	<b>INDICATOR</b>	<b>DEFINITION</b> How is it calculated?	<b>BASELINE</b> What is the current value?	<b>TARGET</b> What is the target value?	<b>DATA SOURCE</b> How will it be measured?	<b>FREQUENCY</b> How often will it be measured?	<b>RESPONSIBLE</b> Who will measure it?	<b>REPORTING</b> Where will it be reported?
Goal								
Outcomes								
Outputs								

Source: Tools4dev

Environmental Monitoring helps to know whether the environment is improving or transitioning towards destruction. Information collected through conducting environmental monitoring is vital to many different decision makers, policy makers and the public. The findings generated from the monitoring system would help to formulate strategies and policies regarding improving the environment (Lovett et al. 2007).

## BEST PRACTICES

In many countries, biological resource monitoring system, which is subject to participation of local people, is being implemented. This system is being suggested to deliver benefits which are two-fold; include empowerment of the local people and promotion of conservation. About three wildlife monitoring systems in indigenous lands and sustainable development reserves in Brazilian Amazonia and Namibian Caprivi conservancies had been implemented and reviewed. The study provided useful insights into possible avenues to reinforce the empowerment outcome of the monitoring systems in Latin America and Africa. Four dimensions of empowerment, which include psychological, social, economic and political, had been assessed at the individual and community scales. The conditions that helped local empowerment include; “the value of natural resources, rights to trade and manage resources, political organization of communities, and collaboration by stakeholders”. The strategies which were employed to empower the local people include; “intensifying local participation, linking them to local education, feeding information back to communities, purposefully selecting participants, paying for monitoring services, marketing monitored resources, and inserting local people into broader politics”. In Namibia, marketing of natural resources had promoted economic empowerment, whereas in Brazil dissemination of information was better because of integrated education programs. It is worth noting that devolving management rights to the communities do not guarantee to fulfill conservation goals. Some communities appeared to reject conservation management activities to fulfill the development interests of the communities. Another challenge of participatory biological resource monitoring is the uncertainty of funding. For example, marketing of natural resources and integrating the system into the education program strategies had continued beyond the initial funding available since the communities got benefits from such systems. However, employing multiple strategies to attain various dimensions of empowerment entail high costs and the benefits cannot be attained promptly (Costantino, et al. 2012).

## Box 2: Monitoring best practices

- Monitoring data should be well-focused to specific audiences and uses (only what is necessary and sufficient).
- Monitoring should be systematic, based upon predetermined indicators and assumptions
- Monitoring should also look for unanticipated changes with the project/ programme and its context, including any changes in project/programme assumptions/risk; this information should be used to adjust project /programme implementation plan.
- Monitoring needs to be timely, so information can be readily used to in from project / programme implementation.
- Whenever possible, monitoring should be participatory, involving key stakeholders- this can not only reduce costs but can build understanding and ownership.
- Monitoring information is not only for project / programme management but should be shared when possible with beneficiaries, donors and any other relevant stakeholders.

The Government of Bangladesh had implemented several development projects for development and biodiversity conservation. The Chittagong Hill Tracts Development Board (CHTDB), a premier government agency that implements most of the Chittagong Hill Tract (CHT) development projects, executed the Upland settlement project (USP) in the CHT region (Nath & Inoue, 2010). The objective of the project was to increase horticulture and rubber plantation in the degraded forestland. The purpose of establishing agro-forestry, commercial plantation and horticulture was to attain sustainable land use practices (Nath & Inoue, 2008a). It had been observed that the planters had given up shifting cultivation and employed soil conservation practices and hence forest coverage had expanded in the project areas (Nath & Inoue, 2008b). However, it had been observed that such developments are often being undertaken without conducting environmental impact assessment which is a violation to the Bangladesh Environment Conservation Act, 1995 and its Rules 1997 (Noor, 2013).

The management of forest resources needs to employ strategies that would engage the government, the community members and the NGOs. The government's initiative to manage the forest resources adopts top-down centralized approach which omits the participation of the local people and the NGOs. People's participation in managing the forest



resources are vital since they have adequate indigenous knowledge to manage the forest resources effectively. Integration of indigenous knowledge coupled with government's and NGOs feedbacks would help to manage the forest resources effectively.

## CONCLUSION

M & E is very effective tools to monitor and evaluate the ultimate achievement of goal of the development project/program. M & E is not only identifying difficulties and challenges of development project/program implementation; it also helps to identify opportunities and way forward to achieve objectives of the development initiatives. However, M & E plan must be linked with Logframe objectives of the project/program to be able to provide feedback to project/program authority on the success of development project/program.

In addition, well-designed M & E mechanism would facilitate to reduce cost associated with environmental management through identification of the actual problems and enabling government to channel resources effectively in one hand and ensure sustainable development on the other hand.



## REFERENCES

Artiola, J.F., Pepper, I.L., Brusseau, M. (Eds.). (2004). *Environmental Monitoring and Characterization*. Burlington, MA: Elsevier Academic Press.

Conrad, C. and Daoust, T. 2008, 'Community-Based Monitoring Frameworks: Increasing the Effectiveness of Environmental Stewardship' *Environmental Management*, vol.41, no.3, pp-358-388

Huque, I, 2000, 'National Report of Bangladesh', *International Archives of Photogrammetry and Remote Sensing*, vol.33, no.B6, pp-368-375.

Islam, A.Z.M.D.Z, Kabir, S.M.H., & Sharifee, M.N.H., 2014, 'Development of National Flood Monitoring System (NFMS<sub>RG</sub>) based on remote sensing and GIS techniques', *Asian Journal of Geoinformatics*, vol.14, no.1, pp-27-31.

**IFRC-ME-Guide-8:** <http://www.ifrc.org/Global/Publications/monitoring/IFRC-ME-Guide-8-2011.pdf>

IUCN Bangladesh, 2011, Protocol for Monitoring of Impacts of Climate Change and Climate Variability in Bangladesh. IUCN (International Union for Conservation of Nature), Dhaka, Bangladesh, Pp xiv + 182.

Lovett, G.M., Burns, D.A., Driscoll, C.T., Jenkins, J.C., Mitchells, M.J., Rustad, L., Shanley, J.B., Likens, G.E., Haeuber, R. 2007, Who needs environmental monitoring? *Frontiers in Ecology and the Environment*, vol.5, no.5, pp-253-260.

Mitchell, B. (2002). *Resource and Environmental Management* (2nd ed.). Harlow: Pearson Education Limited.

Seal, L & Baten, MA, 2012, 'Salinity Intrusion in Interior Coast:A New Challenge to Agriculture in South Central part of Bangladesh', viewed 17 2016

<[http://www.unnayan.org/reports/climate/Salinity\\_Intrusion\\_in\\_Interior%20Coast-A\\_New\\_Challenge\\_to\\_Agriculture\\_in\\_South\\_Central\\_part\\_of\\_Bangladesh.pdf](http://www.unnayan.org/reports/climate/Salinity_Intrusion_in_Interior%20Coast-A_New_Challenge_to_Agriculture_in_South_Central_part_of_Bangladesh.pdf)>

United Nations, n.d, "Sustainable Development Agenda", viewed 1 April 2016, <<http://www.un.org/sustainabledevelopment/development-agenda/>>

United Nations. (1992). *Earth Summit Agenda 21: the United Nations Programme of Action from Rio*. New York, New York, USA.