ENVIRONMENTAL ASPECTS FOR PREPARING DETAILED PROJECT REPORT FOR WATER RESOURCES PROJECTS

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1.0 PROLOGUE

The green revolution brought about in the country during the post independence period has mainly been possible due to various water resources projects. However, like any other developmental activity, the water resources projects have also got certain environmental impacts, both beneficial and harmful. The environmental effects of water resources projects are being experienced and observed carefully in many developed as well as developing countries. A need has also been felt to adopt various measures for minimising their negative effects while maximising the benefits. The objective of Environmental Impact Assessment is to assess both the positive and negative impacts of a project so that necessary environmental management measures can be adopted, wherever necessary, to minimise the adverse impacts.

2.0 ENVIRONMENT

Environment is the current catchword. As it happens with many of the catchwords, people tend to use it without appreciating its meaning. Simply stated, the environment can be defined as one's surroundings. However, a more specific definition is needed to appreciate the issues involved.
The Environment (Protection) Act, 1986 states that "environment includes water, air and land and the inter-relationship which exists among and between water, air and land, and human beings, other living creatures, plants, micro-organism and property". Here we are basically concerned with water and environment and its environmentally sustainable development.

2.1 SUSTAINABLE DEVELOPMENT

Another current catchword is Sustainable Development. It has got many connotations. However, the most common definition is the one given in the famous report of World Commission on Environment and Development viz. “Our Common Future”. It states “Sustainable development is defined as development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs”.

2.2 WATER AND ENVIRONMENT

Water is a major component of that environment in which man occupies the centre-stage. Apart from the need for drinking, water is needed for producing food and fibre; in process industries and manufacturing and to produce energy – hydro, thermal and nuclear. This great need for water has brought into focus the fragility of environment associated with fulfilment of these needs and the need to guard against it. All great civilizations had grown around water and many had perished with or without water, perhaps not having realised the importance of its sustainable development.

The status of water in the environment is unique. Ever since the birth of earth, from day one, the need for water is always on the increase, not just because of increase in human population but because all living beings are multiplying at a fast rate. The increase in demand has brought tremendous pressure on resource development. This has tended to disturb the status of water in the overall environment. The disturbance, if not contained, may seriously impair the capacity of the resource to meet the demands of future generations and the present civilization may have to go the same way as its predecessors. Hence the need for sustainable development of water resources.

2.3 ENVIRONMENTAL AWARENESS IN INDIA

A good environmental sense has been one of the fundamental features of India's ancient philosophy. The earth was called "mother earth" and water, air and sun were considered to be gods. Major rivers like the Ganga and the Yamuna were also treated as mothers. The environmental concerns were integrated into various religious and social customs is such a manner that these were automatically taken care of by the people.

3.0 LEGAL FRAMEWORK

Adequate provisions for protection of environment and forest are made in the Constitution of India. Article 47 provides for protection and improvement of health. Article 48A is directed towards protection and improvement of environment and protection of forest and wildlife. Article 51 (A) says it is the duty of every citizen to protect and improve natural environment. Following the UN Conference on Human Environment (Stockholm, 1972), a constitutional amendment (42, 1976) inserted relevant provisions for environment protection in Constitution in Part IV-Directive Principles and Part IV A- Fundamental Duties.

3.1 ENVIRONMENTAL ACTS

In order to ensure sustainable development from water resources angle the Government of India have enacted various Acts and Legislations. Prominent among these is the Environment (Protection) Act, 1986 through which the Government has acquired wide powers for protecting the environment. Some other Acts related to Water and Environment are Water (Prevention and Control) of Pollution Act, 1974 (amended in 1988), Water (Prevention and Control) of Pollution (Cess) Act.1977 (amended in 1991), Forest Conservation Act,1980 and Environmental Impact Assessment Notification of 1994 (amended in 1997) and the Ministry of Environment & Forest's Notification of Jan. 1997, constituting the Central Ground Water Authority.

The Water (Prevention and Control of Pollution) Act' 1974 seeks to maintain or restore "wholesomeness of Water" and the Central and state Pollution Control Boards have been established under this Act. According to the Water Cess Act' 1997, both Central and State Governments have to provide funds to the Boards for implementing this act. The Forest Conservation Act' 1980 provides for compensatory afforestation to make up for the diversion of forest land to non-forest use. The Environment (Protection)' 1986 was enacted in 1986 for the protection and improvement of human environment. The EIA Notification of 1994 has made the environmental clearance mandatory for all new projects and expansion/modernization of existing projects covering 29 disciplines which include hydro-power, major irrigation and flood control projects. Its amendment in 1997 has made it mandatory to hold environmental public hearing before according environmental clearance. The notification was superseded with EIA notification 2006 where in the projects were classified into 8 broad project categories-

1. Mining, extraction of natural resources and power generation (for a specified production capacity)
2. Primary Processing
3. Materials Production
4. Materials Processing
5. Manufacturing/Fabrication
6. Service Sectors
7. Physical Infrastructure including Environmental Services

8. Building /Construction projects/Area Development projects and Townships

3.2 ENVIRONMENT IMPACT ASSESSMENT (EIA)

EIA is an "anticipatory, participatory, integrative environmental management tool which has the ultimate objective of providing decision makers with an indication of the likely consequences of their decisions relating to new projects or new programmes, plans or policies."
EIA helps the decision makers to identify the likely effects at an early stage and to improve the quality of project planning and decision making. It is a process used to predict the environmental consequences of proposed major development projects, to identify and plan for appropriate measures to reduce adverse impacts.

An EIA attempts to answer the following questions:

1 What will happen as a result of the project?
2 What will be the extent of the changes?
3 Do the changes matter?
4 What can be done about them?
5 How can decision makers be informed of what needs to be done?

Answers to these five questions are through five steps:

1. Identification of impacts.
2. Prediction of significance of causes and effects of impacts
3. Evaluation of the predicted adverse impacts to determine whether they are significant enough to warrant mitigation
4. Suggesting a wide range of measures to prevent, reduce or remedy those adverse impacts which warrant mitigation
5. Documentation of the process and conclusion.

3.2.1 NEED FOR EIA

It is now necessary to have an idea of possible impacts of any developmental plan it is going to have on our environment. Fortunately, adequate legislation could be brought into force to make proper assessment of all such environmental impacts. The objectives of Environmental Impact Assessment(EIA) is to ensure that development is sustained with minimal environmental degradation. EIA refers to the evaluation of the effects of a major projects on a man-made natural environmental. It is the basic tool for the sound assessment of development proposal.
EIA was introduced in the USA following the enactment of the National Environmental Policy Act (NEPA) by the United States Congress in 1969. Since then, many countries have included EIA in their environmental legislation. Today EIA has evolved as a management tool, a planning aid that helps in identifying, predicting, assessing impacts on environment from proposed development projects. It is valuable mechanism that aids in promoting sustainable development.

3.2.2 ENVIRONMENTAL IMPACTS OF WATER RESOURCES PROJECTS

Water Resources Projects cause beneficial as well as adverse impacts both during the construction and the operational phases.

<u>Construction Phase</u>

Beneficial Impacts

The beneficial impacts during the construction phase are as under:
Socio Economic

a) Employment
b) Better Housing/Land
c) Infrastructure Development
d) Communication Improvement

Biotic

a) Compensatory afforestation
b) Improvement of degraded forest
c) Green belt on periphery of reservoir
d) Reduction of pressure on forest

Adverse Impacts

The adverse impacts during the construction phase are as under:

Socio Economic

a) Displacement of People
b) Loss of monument, if any

Biotic

a) Submergence of forest land
b) Effects on flora & fauna

Operation Phase

Beneficial Impacts

The beneficial impacts during the operation phase are as under:

Socio-economic

a) Increased/improved crop production
b) Power generation
c) Water supply
d) Ground water recharge
e) Flood moderation
f) Agro industry
g) Tourism
h) Fodder Production
i) Poverty reduction through Employment generation
j) Animal husbandry
k) Horticulture
l) Drought Proofing
m) Reduction of CO_2 from the atmosphere due to enhanced Photo synthesis
n) Reduction of pressure on fuel wood and fodder due to enhanced bio mass production
o) Improved health services to nearby village population
p) Moderation of climate

Biotic

a) Increased aquatic life
b) Afforestation
c) Migratory birds
d) Enhanced flora and fauna due to water availability
e) Conservation of bio-diversity due to reduction of pressure on forest
f) Alternate employment opportunity to nomad population
g) Protection of forest diversity from flood and drought

Adverse Impacts

The adverse impacts during the operation phase due to mismanagement are as under:

Physical

a) Water logging & Salinity(wrong pricing policy)
b) Change in water quality and sediment load d/s

Biotic

a) Increased aquatic weeds
b) Spread of water borne diseases

c) Deterioration of water quality

3.3 EIA REGIME

The EIA regime is as under :
a) Physical b) Ecological c) Socio economic

3.3.1 PURPOSE OF EIA

The EIA serves one or more of the following purposes:
a) Decision making
b) Choosing among various alternatives
c) Integrating environment cost into project cost.

3.3.2 STEPS

The steps carried out in Environmental Impact Assessment are as under:
a) **Identification** – This involves assessing of the magnitude of impacts, geographical extent, significance to decision makers etc.
b) **Prediction** – This quantifies the impacts through mathematical models, physical models, socio-cultural models, economic models and experiments.
c) **Evaluation** – This predicts adverse impacts by comparing it with laws, regulations or expected standards or by reference to present criteria or on the basis of acceptance to local community or public in general.
d) **Mitigation** - Steps may be suggested for restoration of ecological balance.
e) **Communication** – This involves communication of the results of EIA to the concerned agencies.

3.3.3 EIA PROCESS

The EIA process comprises of the following:

a) Screening

The screening can be either project related or site related. These are briefly described as under:
i) *Project related* – This would determine the threshold value of cost, size and pollution levels
ii) *Site related* – This is based on the assimilative capacity of the project area. The following factors are kept in view while carrying out site related screening:
A) Avoid environmentally sensitive areas
B) Avoid conflict with existing policies, plans & legislation.
C) Avoid conflict with desirable land use e.g. prime agricultural land

b) Scoping

Scoping is carried out with the following objectives:
a) To determine depth of analysis
b) To formulate Terms of Reference
c) To identify prima facie major/minor environmental issues involved
d) To determine geographical boundaries of the study
e) Gives idea about format for Environmental Impact Statement

c) Rapid & Comprehensive EIA

The EIA can either be rapid or comprehensive as under:
i) *Rapid EIA* – This is the first level indication of the environmental issues of the readily available data as utilised for this purpose.
ii) *Comprehensive EIA* – This uses inputs from the rapid EIA. Steps involving are: identification, prediction, evaluation of the possible environmental impacts.

d) Mitigative measures

It comprises of a strategy devised to prevent, reduce and compensate the impacts of the project. The monetary assessment of the mitigative measures is also to be carried out to include into the project cost.

e) Environmental Management Plan (EMP)

This contains details of the Management measures to be adopted. It narrates the key agencies/persons which would be responsible for the implementation of the plan. It also includes disaster management plan.

f) Environmental Impact Statement (EIS)

It is a gist of the whole exercise for getting environmental clearance and also for information of the general public.

g) Post Project Monitoring (PPM)

This is carried with a view to ensure the effective implementation of the mitigative measures.

3.3.4 RESOURCES NEEDED FOR EIA

The following resources are needed for carrying out the proper and effective environmental impact assessment**:**

i) Qualified multi disciplinary team
ii) Data about project and surrounding eco system
iii) Analytical instruments – models
iv) Institutional arrangements

3.3.5 METHODOLOGIES OF EIA

Even though Davies and Muller (1984) have mentioned about one hundred methods for carrying out impact assessment, these can be grouped into the following seven general categories:

i) Ad-hoc method
ii) Checklist
iii) Matrix
iv) Network
v) Overlays
vi) Environmental Index
vii) Cost Benefit Analysis

Each of the above methods is subjective to some extent, and none of these is applicable to every case. The selection of an appropriate method depends on the judgement and experience of the analysts.

a) Adhoc method

Broad areas of possible impacts are identified and the nature of the impacts is qualitatively grouped as given in the following steps:

i) The area over which environmental impact is expected is identified.
ii) The nature of the expected impact is qualitatively categorised as follows:
- positive effect/no effect/negative effect
- beneficial/problematic/adverse
- short term/long term and
- reversible/irreversible.

A major advantage of the adhoc method is that it can be easily applied since it generally consists of statements of data requirements, without outlining the caused by a project. These methods should give a basic idea in determining the alternatives for the proposed project or for site selection. However, they have several disadvantages, including:

- no assurance of the identification of the comprehensive set of all relevant impacts;
- a lack of consistency in analysis due to the lack of specific guidance, and

- inefficiency inherent in identifying and assembling a panel for each impact assessment.

b) Checklist

Checklists identify environmental impacts of development activities on selected parameters. There are four broad categories of checklists. The simple checklist is merely a list of parameters and nature of impacts and does not provide guidance on how the environmental parameters are to be measured and interpreted. The descriptive checklist contains guidance on evaluation of the parameters. The scaling checklist is similar to descriptive checklist, but with additional information on the subjective scaling of the parameters. Scaling-weighting checklist is essentially similar to scaling checklist but with additional information on the subjective evaluation of each parameter.

A form of scaling-weighting checklist is the Environmental Evaluation System (EES) developed by Battelle Columbus Laboratories, USA. It deserves a special mention since it was developed specifically for water resources projects. From the list given by Battelle Columbus, 51 parameters are selected, which have been grouped under Ecology, Environmental Pollution, Human Interest and Physio-chemical parameters. EES is used to evaluate the predicted condition of environmental quality, both 'with' and 'without' the project. The difference in Environmental Impact Units (EIU) between these two conditions as read from value function graphs are added up for arriving at the net impact of the project on environmental quality.

The simple checklist is still commonly used. The use of this technique requires little technical and ecological data, but rather a general familiarity with the region and with the nature for the proposed development projects. More complex checklists are used, but they require considerable resources and involve complex operational procedures (e.g. EES).
Limitations of this technique include the following:
- EIAs depend mainly on the experience and personal judgement of the experts alone. Bias can therefore occur.
- The cause-effect relationship between project activities and environmental parameters cannot be identified.

c) Matrix

Leopold (1971) designed the first matrix used for impact assessment of water resources projects. This method has served as the basis of many of the matrices which have been developed subsequently. Matrix method can be considered to be an extension to the use of checklist. The rows of a matrix indicate impact areas, while the columns list out the project activities. There are various versions of the matrix method which assign magnitude to impacts, importance value to impacts, priority values to activities, relative weights to impacts and thus facilitate ranking of alternatives.

If the relative priority of development activity is determined, then the total value of a particular activity is the vertical sum of the column represented by that activity in the matrix multiplied by the priority value. Finally the total value of interaction is the sum of all horizontal values in the matrix. The objective should be to minimise the total value of the interaction. The procedure helps to identify major activities and to defined areas which need more attention and perhaps further study.

Matrices by themselves do not offer adequate criteria for decision-making; nor do they facilitate later monitoring of impacts. Further, the matrix method assumes that all interactions and dependencies between components are of equal importance.

d) Network

The network method is an attempt to analyse the series of impacts that may be triggered by project activities. A list of project activities is prepared to identify cause condition relationships. The approach is generally to define a set of possible impacts (from past experience of a particular

project) and allow the users to identify likely impacts from the specific project being addressed. Primary, secondary and tertiary impacts are identified.
The major strengths of the network approach are twofold: its ability to identify pathways by which both, direct and indirect environmental effects are produced, and its usefulness in the consideration of mitigating measures during the early stages of project planning. The network effectively presents a display of factual information, but includes no mechanism for accommodating public input.

The network method may be best suited for single-project assessments, and is not recommended for large regional actions. In the latter case the display may sometimes become so extensive that it may be of little practical value, especially when several alternatives need to be considered.

e) Overlays

This method relies on a set of maps depicting environmental characteristics (physical, ecological, aesthetic etc.) of a project area. A transparent overlay sheet is prepared as the base map, showing the location of the project and the boundaries of the area that has to be considered for the assessment of impacts. Transparent overlays are also prepared for each feature that is to be assessed. The degree of impact of each feature can be shown by the intensity of shading taken from a specific black and white colour code. The extent of an impact can be easily indicated by the area of the transparency that has been given a particular shading., A representation of the aggregate impact on different areas is shown by the relative intensity of the shading.
This simple method of visually representing individual impacts and combinations of impacts has a number of advantages. For example, it is a good method for showing the spatial distribution of impacts, and is widely used when selecting a route for a new highway or electrical transmission line.
A number of disadvantages to manual overlays should also be noted. Interpretation of more than 12 overlays at one time is often difficult and this means that only a limited number of impacts can be considered. This constraint can be overcome by use of computers and computerized overlays have been successfully used for assessing a number of developments.
The overlay method is most useful in screening alternative project site or routes preliminary to detailed impact analysis, and overlays are a very useful "search" mechanism for identifying the least environmental impact site or route of a linear project.

f) Environmental Impact Index

The method involves the estimation of an environmental index using factor analysis. Conceptually, it has not yet been possible to develop environmental indices which can be used for planning and management of water projects, except in a simplistic fashion.

g) Cost-Benefit Analysis

The ideal EIA methodology would be the one which accurately incorporates the environmental costs and benefits of a project within the conventional context of cost benefit analysis. However, economic evaluation relies on the factor of measurement of the physical, chemical and biological aspects of development activities and then transforming them into monetary terms. This technique strives to consolidate all effects into monetary terms, and the conclusions are expressed in terms of cost-benefit ratios.
The difficulty encountered in the use of this technique is, of course, that impacts have to be transformed and stated in explicit monetary terms and this is not always possible, especially for all environmental and social intangible factors.
Cost-benefit analysis was initially developed for use in flood control projects in the United States in the 1930s. Even though the technique has been significantly improved in recent years, it can handle environmental parameters in a very limited fashion.

4.0 ENVIRONMENTAL CLEARANCE OF PROJECTS

In order to assess the impact of the developmental projects/activities on the environment, the Ministry of Environment and forests (MOEF), Govt. of India has issued a gazette notification on the EIA on January 27, 1994 (as amended on May 4, 1994) and made environmental clearance statutory for all the projects located in ecologically sensitive/fragile areas as notified by the Govt. of India from time to time. This notification was superseded by EIA Notification issued in September 2006. These also include WRD projects. In the present paper, issues like statutory requirements for the environmental clearance, procedure for environmental clearance, time limit for clearance, single window clearance, validity of the clearance letter, post-project monitoring, right of entry and inspection at the site, misrepresentation/manipulation or concealment of data and requirement of fresh clearance for the expansion/modernisation projects are discussed in detail. Environmental safeguards/conditions generally stipulated by the MOEF Govt. of India for the WRD projects are also mentioned.

Observations reveal that each WRD project i.e. hydroelectric, irrigation or flood control project brings broad range of impacts including alterations in the habitats and species, diversity of area, changes in landuse pattern, aesthetics, natural and artificial resources and also affects upstream and downstream biology, hydrology and sociology. Although, water used in the WRD projects may be free, inexhaustible and reusable but the same is not true for the environmental aspect. Environmental aspects need to be scrutinized for the sustainable development to mitigate the negative impact caused by WRD projects.

Before January, 1994, it was an administrative requirement for the mega projects to obtain environmental clearance from the MOEF, Govt. of India. However, EIA notification issued by the MOEF in January, 1994, (as amended in May, 1994) and subsequently EIA notification issued in September 2006 makes environmental clearance statutory for projects as mentioned in Schedule of the EIA notification. It also includes hydroelectric, irrigation and flood control projects. Details of procedure for obtaining environmental clearance, public involvement and time schedules for decision taking are also mentioned. MoEF has issued EIA notification in September 2006 which supersedes previous notification.

The categorization of Water Resource Projects for environmental clearance is as below-

Project	**Category A**	**Category B**	**Remarks**
River Valley Projects	(i) ≥ 50 MW HEP (ii) ≥ 10,000 ha. of CCA ---------- Expert Appraisal Committee (EAC), MoEF	(i) < 50 MW ≥ 25 MW HEP (ii) < 10,000 ha. of CCA ---------- State level EAC or SEIAA	General Conditions shall apply EC Clearance Authority

4.1 GUIDELINES FOR PROJECT PROPONENTS FOR WATER RESOURCES PROJECTS

Procedures and guidelines for getting the environmental clearance for any developmental project are also published. Besides, comprehensive "Guidelines for River Valley Projects" to enable the project proponent to choose the most appropriate site for their projects and prepare necessary requisite documents such as EIA, Environmental Management Plans (EMP) etc. have also been published and project proponents have to follow them (MOEF, 1985).

4.2 VALIDITY OF THE CLEARANCE LETTER

The clearance granted to any project is valid for five years only for commencement of the constructions or operation. One has to apply for fresh clearance after expiry of the due date.

4.3 WORK AT SITE

No construction work, preliminary or otherwise relating to setting up of the project may be undertaken till the environmental and/or site clearance is obtained.

4.4 RIGHT OF ENTRY AND INSPECTION

The EAC experts shall have full right of entry and inspection of the site at any time prior to during or after the commencement of the operation relating to the project.

4.5 MISREPRESENTATION/MANIPULATION OF DATA

Concealing factual data or submission of false information, misleading data, engineered reports, false decision and recommendations may lead to the project being rejected. Approval, if granted earlier on the basis of false data can also be revoked.

4.6 EXPANSION AND MODERNIZATION OF EXISTING PROJECTS.

A fresh environmental clearance is required for the expansion/modernization project if the resultant pollution load is to exceed the existing levels. A certificate issued by the SPCB will have to be submitted to the IAA who will review such cases in the public interest justifying the need for another environmental clearance.

If land and all relevant clearances of the State Govt. including "NOC" from the SPCB have been obtained before 27th January, 1994, a project proponent is not required to seek environmental clearance from the IAA, however, those units who have not as yet commenced production will inform the IAA.

Projects which have been cleared by the Ministry of Environment & Forest before EIA Notification, 1994 and no construction/operation work is started till 01.08.98 due to any reasons i.e. non-availability of financial resources, forest clearance, infrastructure like land, electricity, road etc. or Interstate water dispute, their environmental clearance will be invalid. In all such cases, fresh environmental clearance is to be obtained if these projects come in the 29 categories listed in the EIA notification (MOEF, 1998).

5.0 ENVIRONMENTAL SAFEGUARDS/CONDITIONS STIPULATED FOR WRD PROJECTS

Following are the general environmental safeguards /conditions stipulated by the Govt. of India for implementation by the project proponents for maintaining the environmental and ecological balance in the concerned area:

(i) Free fuel wood supply to be provided to the labourforce at the project cost.

(ii) Restoration of construction area ensured by levelling, filling of borrow pits and land escaping. Necessary soil conservation measures during construction of roads.

(iii) Afforestation/compensatory afforestation.

(iv) Catchment area treatment as per the scheduled plan and completed before filling up the reservoir.

(v) Adequate arrangement to prevent incidence of any endemic health problems due to water/soil borne diseases.

(vi) A multidisciplinary Environmental Management Cell to be constituted by the State Govt. in consultation with the MOEF with inclusion of experts from the disciplines such as forestry, ecology, wildlife, social science etc. to oversee the effective implementation of suggested environmental measures.

(vii) Adequate and separate budget for the environmental management.

6.0 ENVIRONMENT MANAGEMENT PLAN (EMP)

Preparation of environmental management plan is required for formulation, implementation and monitoring of environmental protection measures during and after commissioning of projects. The plans should indicate the details as to how various measures have been or are proposed to be taken including cost components as may be required. Cost of measures for environmental safeguards should be treated as an integral component of the project cost and environmental aspects should be taken into account at various stages of the projects:

- Conceptualization: preliminary environmental assessment
- Planning: detailed studies of environmental impacts and design of safeguards
- Execution: implementation of environmental safety measures
- Operation: monitoring of effectiveness of built-in safeguards

List below indicates the EMP involved in a WRD project-

(1) Catchment Area Treatment Plan
(2) Creation of Green Belt around the Periphery of the Reservoir and Compensatory Afforestation Scheme in consultation with the State Forest department.
(3) Biodiversity Conservation and Wild life Management Plan
(4) Fisheries Development plan
(5) Resettlement & Rehabilitation (R&R) Plan along with social/community development
(6) Muck Disposal Plan
(7) Energy Conservation Measures
(8) Dam Break Analysis & Disaster Management Plan
(9) Restoration and landscaping of working Areas
(10) Public Health Delivery System including the provisions for drinking water facility for the local community
(11) Sanitation & Solid Waste Management Plan for domestic waste from colonies and labour camps, etc
(12) Water and Air Quality & Noise Environment Management during construction and post-construction periods
(13) Forest Protection Plan
(14) Reservoir RIM Treatment Plan
(15) Environmental Monitoring Programme (With physical & financial details covering all the aspects form EMP)

7.0 PROVISIONS IN NATIONAL WATER POLICY IN RESPECT OF ENVIRONMENTAL ASPECTS OF WATER RESOURCES PROJECTS

Para 1.2 The present scenario of water resources and their management in India has given rise to several concerns, important amongst them are;

Sub Para (iv) Climate change may also increase the sea levels. This may lead to salinity intrusion in ground water aquifers / surface waters and increased coastal inundation in coastal regions, adversely impacting habitations, agriculture and industry in such regions.

Sub Para (xi) Growing pollution of water sources, especially through industrial effluents, is affecting the availability of safe water besides causing environmental and health hazards. In many parts of the country, large stretches of rivers are both heavily polluted and devoid of flows to support aquatic ecology, cultural needs and aesthetics.

Para 1.3 Public policies on water resources need to be governed by certain basic principles, so that there is some commonality in approaches in dealing with planning, development and management of water resources. These basic principles are: