

# Environmental Impact Assessment of a Watershed Project – A Review

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**Abstract:** Watershed management means the process of creating and implementing plans, programs and projects to sustain and enhance watershed functions that affect the plant, animal and human communities within a watershed boundary. Watershed management is not so much about managing natural resources, but about managing human activity as it affects these resources. The drainage area of the river provides the natural boundary for managing and mitigating human and environmental interactions. Because human activity includes actions by government, municipalities, industries, and landowners; watershed management must be a cooperative effort. Effective watershed management can prevent community water shortages, poor water quality, flooding and erosion. The expense of undertaking watershed management is far less than the cost of future remediation. All development activity has an impact on environment. While development is necessary to improve the quality of life, it is equally essential to ensure that the development is sustainable.

Environmental impact assessment is considered as crucial tool and mechanism for sustainable development. Environment impact assessment can be defined as systematic identification and evaluation of the potential impact (effect) of proposed projects to relative physical, chemical, biological, cultural and socio-economic component of the environment. With growing scarcity of water and deteriorating quality, water resources management in India is becoming more challenging with the passage of time. This article discusses the likely impacts in the water sector and the overarching actions that India needs to initiate to overcome/manage them.

**Keywords:** Watershed, EIA, MoEF.

## I. INTRODUCTION

Increased competition for the limited ground water resource has resulted into the rapid depletion of sources

which in turn creates unmanageable water scarcity problem during summer almost in all the agro-climatic zones of India. The impact of a watershed development programme on drinking water sources in watershed villages and peripheral villages is a complex phenomenon. A study of a watershed development model from differing physical and socio-economic framework reveals the variability in the nature and degrees of impacts of watershed development on drinking water regimes from various agro-climatic regimes of India [1]. An Environmental Management Plan (EMP) is a part of Environmental Impact Assessment (EIA) report. The purpose of EIA is to identify, predict and evaluate impacts of the project on the environment and to formulate mitigation strategies to minimize adverse impacts that are likely to occur during project implementation and operation. In the process of EIA, the formulation and implementation of an EMP lays the framework for continued assessment of potential impacts through the application of monitoring and auditing.

## II. WATERSHED MANAGEMENT PROGRAM

The word "Watershed" introduced in 1920 was used for the "Water Parting Boundaries". Deterioration of natural resources can be checked only by Watershed development. Due to scarcity of water and cultivable land and increased rate of population, now it is necessary to make optimum use of the available natural resources.

Soil and Water are the natural resources which are essential for the survival for humans who depend on these for basic needs. However continued pressure and over exploitation to meet the demands of an ever increasing population deplete these resources [7]. Fig 1 gives an idea about plan of a watershed area.

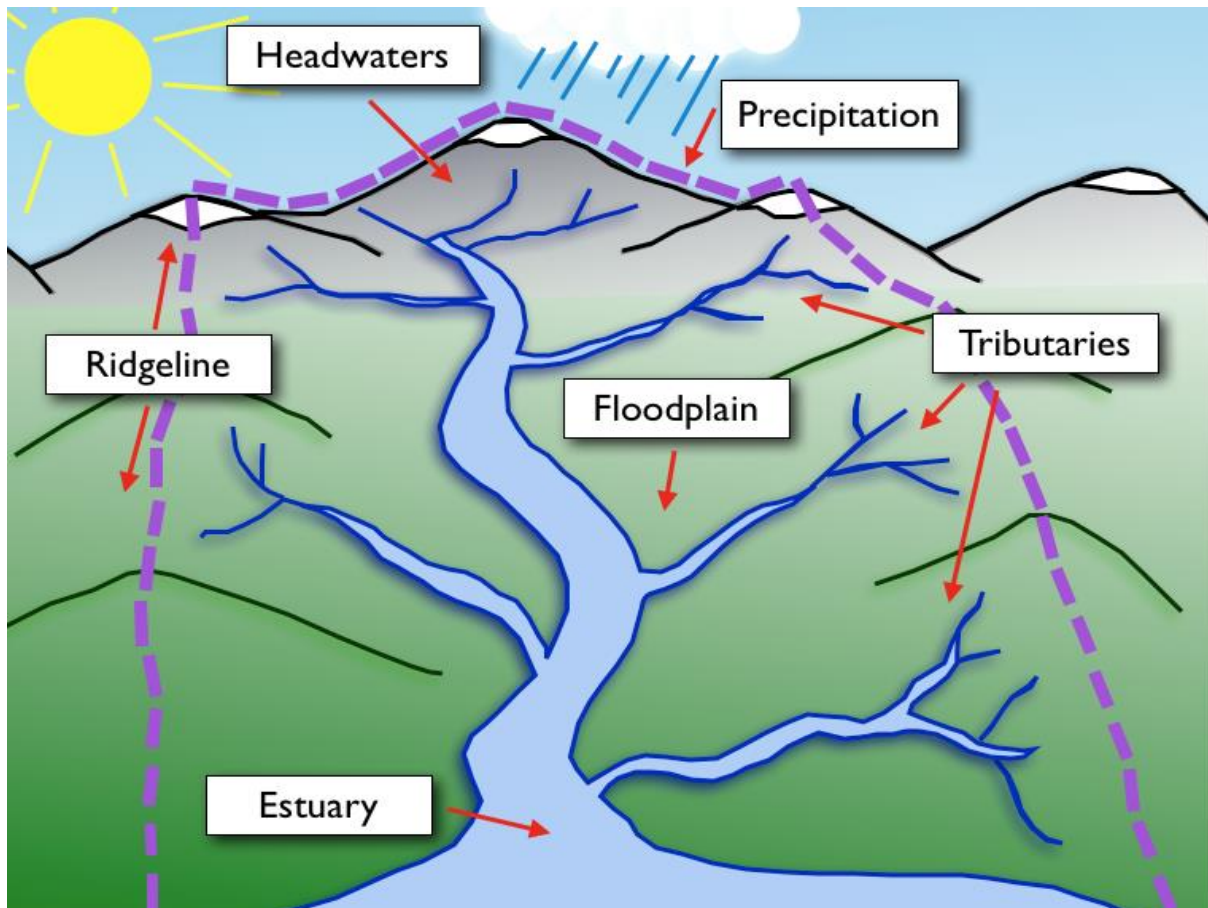


Fig. 1. Plan of watershed area

### III. THE ENVIRONMENTAL IMPACT ASSESSMENT (EIA) STUDY

EIA's are planning instruments that aim to contribute to the design phases of the development as well as function as a management tool to minimise potential negative impacts and maximise benefits during construction and operational phases of a project. To be effective in this role the EIA needs to form an integral part of the project design process. In this way the environmental implications of various design alternatives can be evaluated and the cost/benefits of the different trade-offs assessed. The result is that potentially negative impacts can often be avoided and almost always reduced, without compromising the real cost of the project. Conversely, positive environmental outcomes associated with the project can be enhanced [8].

### IV. OBJECTIVES AND PROCESS OF EIA

The EIA has a number of specific objectives, as follows:

- Collection of baseline information/data for assessment of impacts;
- Collation of information collected during previous investigations into one comprehensive environmental document;
- Assessment and evaluation of the actual and potential environmental impact of the proposed development; and

- Development of costed and resourced Environmental Management and Monitoring Plans to identify mitigation strategies targeted towards avoidance, minimisation and rehabilitation of impacts.

The EIA process involves several key elements:

- *Scoping* – to identify the issues and impacts that are likely to be important and refine the terms-of-reference for the EIA.
- *Examination of Alternatives* – to establish an environmentally sound preferred option for achieving the objectives.
- *Establishment of the Environmental Baseline* – for the bio-physical, social and economic aspects of the environment to establish prevailing conditions prior to development of the project.
- *Impact Analysis* – to identify and predict the likely environmental, social and other related effects of the project.
- *Mitigation and Impact Management* – to establish the measures that are necessary to avoid, minimise or offset predicted adverse impacts and, where appropriate, to incorporate these into an environmental management plan (EMP).
- *Evaluation of Significance* – to determine the relative importance and acceptability of residual impacts (i.e. impacts that cannot be fully mitigated).

- *Preparation of the Environmental Impact Statement* – to clearly document the impacts of the proposal, significance of effects and the plans to deal with these issues [5].

## V. LITERATURE REVIEW

*Reference [2]*, stated that Watershed management is a holistic approach to managing watershed resources that integrates forestry, agriculture, pasture and water management, with an objective of sustainable management of natural resources. This approach seeks to promote interactions among multiple stakeholders within and between the upstream and downstream locations of a watershed. The experiences from Nepal suggest that these ideals of watershed management do not appear to be strongly linked with the current policies, programmes and practices. A mechanism for constant dialogue between policymakers, practitioners and communities at landscape level would help in linking the upstream and downstream ecology to improve the livelihoods of the local people and sustainable watershed resource management.

*Reference [6]*, shows that integration of environmental aspects into development programmes and projects has been a part and parcel of environmental management. In Nepal, this integration has been ensured through environmental assessment - commonly understood as a planning and management tool for the last 25 years. A number of policies and legislations are in place to make the development proposals environment-friendly and sustainable and make effective use of this tool. After the enforcement of the Environment Protection Act, 1996 and its Rules, 1997, the preparation and implementation of the Environmental Management Plan (EMP) has been an integral part of the Environmental Impact Assessment (EIA) report. The Plan provides guidance to implement the benefits enhancement measures and adverse impacts mitigation measures along with the conduction of the environmental monitoring and auditing.

*Reference [3]*, in his assessment concludes that a wide range of sustainable development activities being considered for the Demonstration Study Area (DSA), and by extension, the Body Ponds Watershed can result in positive environmental impacts. It also suggests that actions to slow the current high rate of land use changes and permitting of new developments ("Freeze-in-Place") are likely to have positive effects even if applied on an interim basis while policy-making processes deliberate the wider range of legal, regulatory and institutional reforms that have been suggested or recommended in other watershed management studies of the Small Island Resource Management Mechanism (SIRMM).

*Reference [4]*, uses EIA as a tool for decision-makers to identify potential environmental impacts of proposed projects, to evaluate alternative approaches, and to design and incorporate appropriate prevention, mitigation, management and monitoring measures. Environmental

impact assessment cannot be divorced from social impact of the project, hence the latter is considered as a key dimension of the EIA process. Examples of these close interactions can be found in the context of land tenure and rights, rural livelihoods, and traditional practices. EIA is also expected to help ensuring protection, maintenance and rehabilitation of natural habitats and their functions in the context of FAO's field projects and policy dialogue with countries. Environmental Assessment may be quite complex, especially if applying to broad policies and large sector programmes. Nevertheless most FAO projects may not require a fully-fledged EIA and may be reviewed with limited analytical effort. Still, they will need to undergo the screening procedures described under the present guidelines. Where significant potential negative impacts or areas of serious public concern are foreseen, a more detailed EIA will need to be prepared, including full technical justifications and public exposure.

*Reference [11]*, in Ethiopia, recognised the importance of follow-up in the environmental impact assessment (EIA) process. Follow-up involves the implementation of measures taken to mitigate the adverse environmental impacts of a project and monitoring to determine their effectiveness. This paper reports on a study of the follow-up of EIA-recommended mitigation measures in the Koga irrigation and watershed management project. The study found that the monitoring of impacts and the implementation of mitigation measures are currently very poor. Public participation in the project is also very limited. Hence, unless improvements are made it is likely the sustainability of the project may be severely compromised.

*Reference [9]*, after three decades of experience of watershed management, it is timely to take stock of what has been learned and to draw out pointers that can help define future development paths. The first generation of watershed management operations in developing countries in the 1970s and 1980s gave priority to protection of downstream assets, particularly reservoirs, and tended to adopt engineering solutions. In the 1990s, a new generation of developing country watershed management operations focused more on the problems of natural resource management and poverty reduction in upland areas, using farming systems and participatory approaches. The objective of this report is to evaluate the experience of this second generation of watershed management operations, to summarize the current state of knowledge, and to assess outstanding issues and possible future directions.

*Reference [7]*, states that Watershed management means the process of creating and implementing plans, programs and projects to sustain and enhance watershed functions that affect the plant, animal and human communities within a watershed boundary. Watershed management is not so much about managing natural resources, but about managing human activity as it affects these resources. The drainage area of the river provides the natural boundary for managing and mitigating human and environmental interactions. Because human activity includes actions by

government, municipalities, industries, and landowners, watershed management must be a cooperative effort. Effective watershed management can prevent community water shortages, poor water quality, flooding and erosion. The expense of undertaking watershed management is far less than the cost of future remediation.

## VI. CONCLUSION

The ultimate goal should be to reduce the role of the evaluator in the assessment of impact importance which makes the process more effective and reliable the focus should be on introducing additional quantitative aspects into the assessment processes with respect to the quantification of the effect of the activities. The project moreover requires an effective environmental management plan (EMP) the EIA and EMP will help in addressing all issues during the pre-construction, construction and post-construction stages of the project. Keeping in view of the impacts predicted suggestion for the impact prevention and mitigation strategies need to be defined because they will help in preventing adverse impacts from happening and to keep those that do occur within an acceptable level. This methodology can also be extended to determine the impact other activity and projects such as construction of dams, harbours, nuclear power plants etc.

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