



Emerging approach towards environmental risk assessment (ERA) and management

Kumar Navin¹, Dr. Kamal Kant Patra²

¹ Researcher, Department of Chemistry, School of Science, YBN University, Ranchi, Jharkhand, India

² Associate Professor, Department of Chemistry, School of Science, YBN University, Ranchi, Jharkhand, India

Abstract

In India, we have Impact Assessment/Environmental Impact Assessment (EIA) and Risk Assessment (RA) as two frameworks. These two frameworks provided scientific assessment procedures in the field of environment and safety separately. After Bhopal Gas Disaster in 1984 in India, a new approach emerged toward the Assessment which is the combination of EIA and RA as ERA (Environmental Risk Assessment). An ERA is also termed Ecological Risk Assessment. This is a scientific framework for the environmental Risks Assessment to take care of the Environment and Safety Aspects of the Industry, People, and surrounding. This paper introduces the concepts, development history, recent research methods, recent standards and results as well as their applications

Keywords: ERA, ERA article, environmental risk assessment, ecological risk assessment, ERA research, India, Kumar Navin, safety with Navin

Introduction

India is a developing country and now has emerged as one of the leading manufacturing countries in the world. It is itself his having the maximum manpower in the world. There are large natural resources available in India. Due to the various manufacturing industries from India and the world, the industries in India are having various gas and chemicals. The release of Gas and Chemicals not only leads to environmental but also safety Risks to the community in which they operate. Disposal procedures for the Hazardous Gas, Hazardous Chemicals, and Hazardous Gas are also a very big issue and involved a huge cost and advanced technology hence this is a challenging issue. As a concept of the Environmental Risk Assessment it is the factors of all the input and output of a plant, process, storage, or combination of these which can result in undesired, uncontrolled incidents which can penetrate its limit or exceed its limit and cause harm to people, plant, processes, community, working environment and environment at a large.

Literature review

We know many disasters and incidents which have caused risk to the community in with they operated. In India and other parts of the world. In 1984, the Bhopal Major Industrial accident as Flixborough (Dunton, 1974), Seveso Disaster in Italy in 1976 (Less.1996), On 4th December 1984, Gas Disaster in India due to the leakage of Isocyanate gas from a pesticide plant. In 1986 the Chornobyl nuclear accident in the former Soviet Union. Piper Alpha disaster in the North Sea in 1988, the Deep Water Horizon oil spill in the Gulf of Mexico 2010. In 2005, the fatal pollution event of the Songhua River were caused by the phenol installation of the Petrochemical Company. At Nagothane, Maharashtra in the year 1990, a leak occurred in a pipeline transporting ethane and propane to a gas cracker complex, a vapour cloud formed and ignited at an off-site gas treatment and compression facility. The resultant vapour cloud explosion did not damage the cracker, but serious damage was done to

the offsite units. The LPG fire and explosion occurred in a refinery at Visakhapatnam in 1997. In 2007, an accident took place in a refinery at Visakhapatnam, the leak went undetected and resulted in a vapour cloud, fire and explosion.

Based on the literature review the historical development of HRA is

Historical development of ERA in the United States

United States is the first country to enact the National Environmental Protection Act (NEPA) of 1969 making Environment Impact Assessment (EIA) mandatory. In the US the ERA started much before 1984. In the 1970s one of the United State conferences named "Large Scale Nuclear Power Plant in the theoretical possibility of major accidents and Consequence." professionals studied 1970 were presented. The conference was organized by States Atomic Energy Commission (USNRC).

USEPA (United State Environment Protection Agency) published a report Framework for Ecological Risk Assessment in 1992. Which got replaced in the year 1998 by a new guideline "Guideline for Ecological Risk Assessment". The interaction between the following parties at the beginning (planning and problem formulation) and end (risk characterization) of the risk assessment process is a prominent focus of the recommendation. Site representatives as Risk Managers, experts as risk assessors and interested parties.

Development of ERA in Japan

In Japan, in the year 1975, the Conference of Human Environment International Sciences was held in Tokyo. Walter proposed an environmental impact assessment should include the impact analysis in the policy, and make contingency Plans.

Development of ERA in Europe

European Economic Communities (EEC) in the year 1987 made a provision for the factory that they must carry out

Environmental Risk Assessment which may be prone to chemical accidents.

Development of ERA in China

In the year 2004, China formulated a Technical Guideline for the Environmental Risk Assessment on Projects

(HJ/T169-2004). As per S.Y.Liu, H/Q Wang, W.L.Li, China .Published paper. The major research methods in China “Current Progress of Environment Risk Assessment Research” The ERA methods have been divided into two parts Quantitative and qualitative methods (Figure 4).

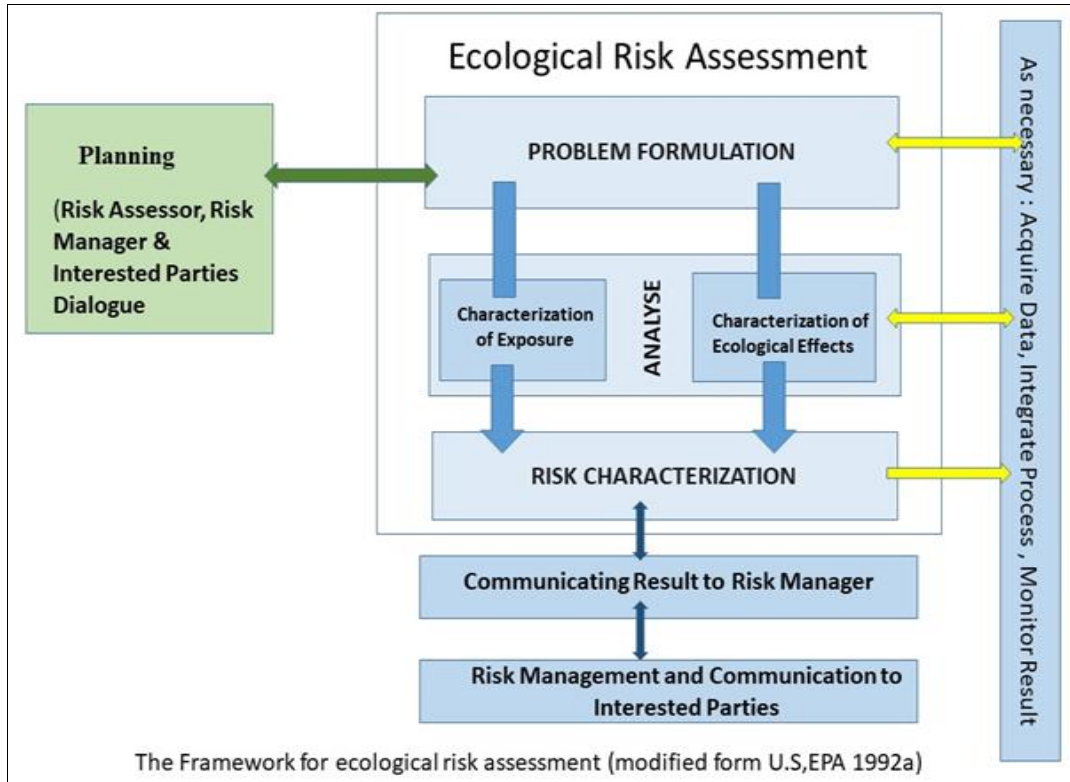


Fig 1: The Framework for ecological assessment (Source EPA Guideline for Ecological Risk Assessment 1998 modified from US EPA 1992a)

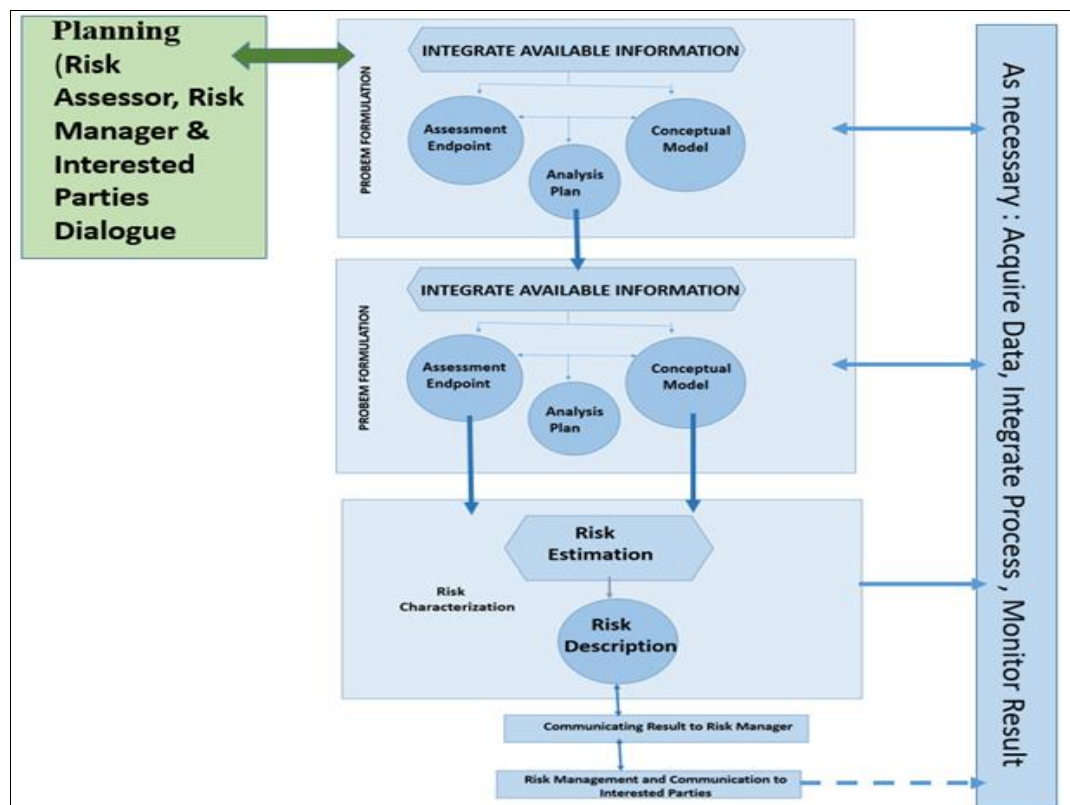


Fig 2: As per EPA 1998 The ecological risk assessment framework, with an expanded view of each phage. Within each phase, rectangular designated inputs, hexagons indicate actions, and circulars, represent outputs. (Source EPA Guideline for Ecological Risk Assessment 1998)

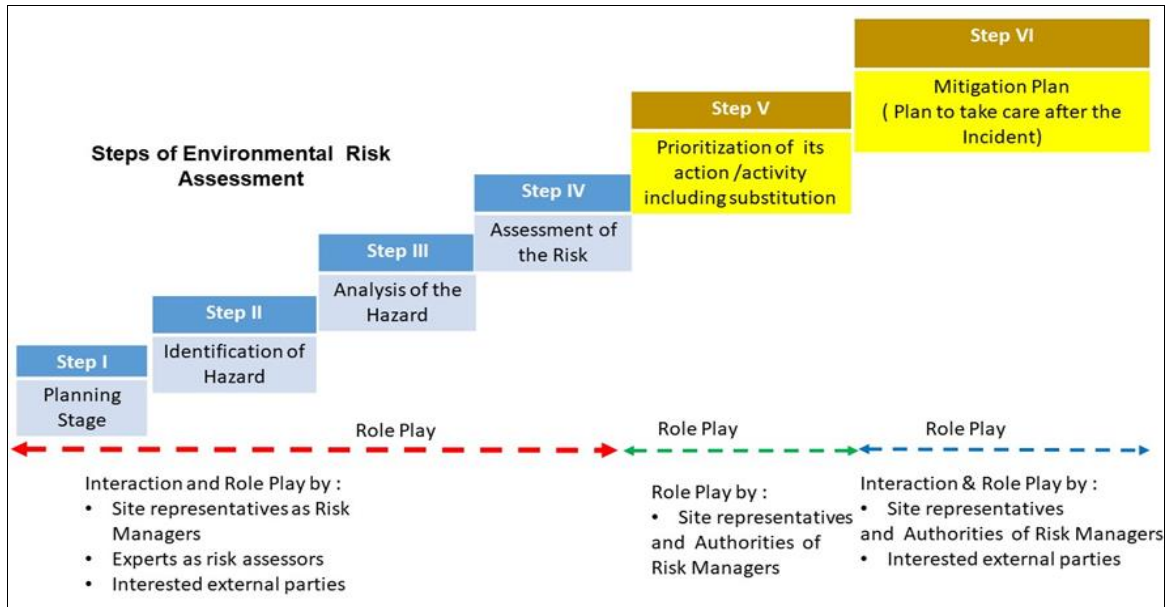


Fig 3: ERA framework emerging in some Industries in India (Source: GCLT Private Limited)

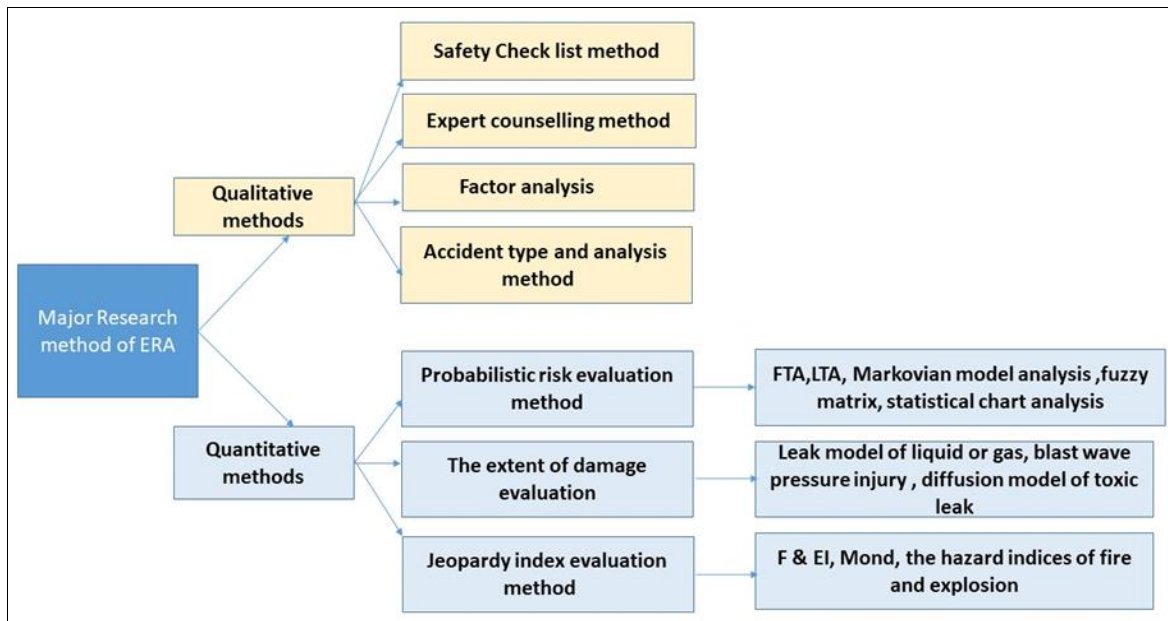


Fig 4: Major Research Methods of EPA, iChina (Source Published paper of S.Y.Liu, H/Q Wang ,W.L.Li, China)

Development of ERA in India

As per the Environmental Clearance Guideline, the provisions of EIA are there and the content of the Risk assessment is also there. That is applicable to certain Gas Industries and for isolated Gas and chemical storage above threshold quantities of gas/chemical specific.

On May 23, 1986, the Indian government passed the Environment (Protection) Act. Making EIA statutory was one of the decisions made to carry out the Act's goals. Following due process, a notification was released on January 27, 1994, and later revised on May 4, 1997, April 10, 2000, and January 27, 2000, and last amended to make environmental impact assessment mandatory for certain activities.

An ERA is emerging in some Indian Industries. This is the framework based on the Literature review for the Industry studied:

The Environmental Risk Assessment Process involves five steps. Step I Planning Stage. problem formulation by determining the scope and boundaries of the assessment,

and selecting ecological entities that will be the focus of the assessment Step II is the identification of the hazards, Step III is the Analysis of the hazards like evaluation of its failure, evaluation of its level of impact, evaluation of its duration of impact, evaluation of the impact at a distance from the source i.e Hazard Range, evaluation of its nature, evaluation of its damage potential, Evaluation of the Vulnerability Probability of the Incident, Step IV Assessment of the Risk also called risk categorization utilizes an ecological viewpoint while discussing and analyzing and reporting risks. Step V Prioritization of its action /activity including substitution Step VI Post incident plan like mitigation plan, On-Site- Emergency Planning, Off-Site Emergency Plan, Rehabilitation.

Material and methodology

The method adopted for the study as

- a. Survey
- b. Checklist-based review/ERA Audit
- c. Comparison methods

ERA survey

Questioners were made and circulated to the Workmen, Supervisors before and after HRA. A drop box was made all workmen and supervisors were able to read and write in Hindi. A total of 20 questions were selected for the review. They participated in the HRA and once again the same questionnaire was circulated and gain they dropped it in the drop box.

There were no requirements to fill in their name. Serial numbers were assigned to the survey sheet and all serial numbers was having one plus one copy and were given both to the same person. There was a choice that can pick any serial number and not show the serial number to another person. The survey sheet was evaluated before and after the HRA. The survey result was found with improving Trends in the awareness level.

Table 1: Satisfactory level of Answer

Survey Question	By Workmen		Supervisor	
	Before ERA	After ERA	Before ERA	After ERA
20 Components of Environment, Safety and Industrial Health & Hygiene	53%	92%	68%	100%

Various proper work environment-related issues were addressed by the workmen and supervisors after the server which has been acknowledged by the Management.

ERA checklist-based audit

The researcher prepared one ERA Audit Checklist.

1st ERA Checklist based Audit given to two supervisors to carry out an internal self-ERA Audit and identify the gap and classify the observations based on the level of Risk. They were assigned two different sections for the ERA Audit.

2nd ERA Checklist based Audit was organised by interchanging both supervisors from the previous section.

3rd ERA Checklist based Audit was organised with participation from workmen and supervisors for both sections using separate HRA Audit sheet.

4th ERA Checklist based Audit was organised with participation from Director, Workmen and Supervisor for both the sections.

Data interpretation, result and discussion

The maximum outcome came out of the 3rd ERA as per the above. It was observed that 7 out of 9 action points observed in the 4th ERA Audit were addressed within 7 days from the ERA Audit.

Conclusion on HRA and management

An ERA is a systematic approach towards management. Dialogue of Risk Manager, Risk Assessor and Interested parties makes ERA management more effective. More Research work and awareness of ERA need to emerge in India.

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