

Integrated Flood Management in Urban Flooding

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Abstract - Flood Hazards are most common and destructives of all natural disaster. The study has major objectives of evaluating flood risk mitigation strategies in Mumbai, which has suffered perennial flooding and needs establishment of coastal management zoning authority, Land use zoning , legislation Building codes, flood forecasting and warning system. Flood insurance based on concept of Vulnerability index, Standards of preparedness and Integrated Water Resource management techniques presented in this paper.

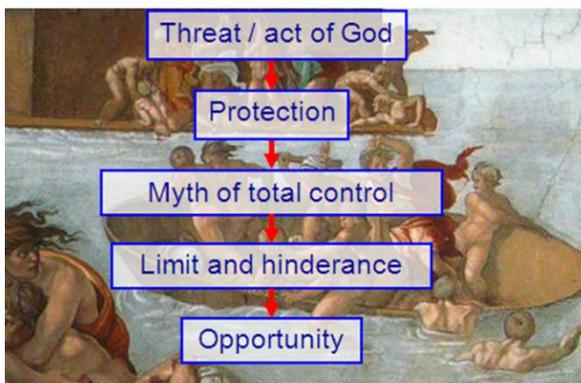
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degradation into sound flood management practices revolve around communication gaps between the various discipline groups involved – understanding the varying perspectives of sustainable development.

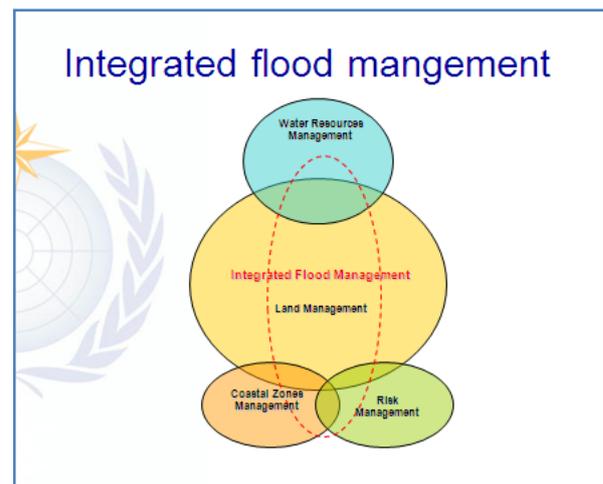
This paper presents IFM approaches with special reference to environmental aspects and is an attempt to narrow this gap. It has been prepared primarily for flood managers to enable them to understand the range of environmental issues involved in flood management. At the same time, it provides useful information for policy makers environmental groups, NGOs and communities, to help them assess flood risks in relation to environmental concerns and sustainable development..

I. INTRODUCTION

Changing perceptions of floods



Integrated Flood Management (IFM) addresses issues of human security and sustainable development from a perspective of flood management, within the framework of Integrated Water Resources Management (IWRM). Some of the underlying causes that make it difficult to integrate the growing concerns regarding environmental



There are no universal criteria to determine environmentally friendly flood management practices. It is crucial to adopt practices that suit the particular circumstances in a given hydro-climatic, topographical and socio-economic setting and follow a rational and balanced approach in addressing environmental issues in flood management.



Historically, flood plains have been the preferred places for socio-economic activity as is evident from the very high densities of human settlement found there. Flood management plays an important role in protecting people and their socio-economic activities in flood plains from flooding. However, strategies that largely rely on structural solutions (e.g. dams and reservoirs, embankments, bypass channels, etc.), unfortunately alter the natural environment of the river, resulting in loss of habitats, biological diversity and ecosystem productivity. The need for sustainable development has highlighted the importance of addressing the negative consequences of such flood control and protection measures on the environment and has led to a paradigm shift from flood control to flood management.

Environmental degradation has the potential to threaten human security, including life and livelihoods, and food and health security. Ecosystems, such as forests, wetlands and lakes provide enormous services to us. These services include food provision, drinking water supply, water purification, regulation of flow regimes, and sustaining cultural heritage. Natural ecosystems are highly resilient, at the same time it is difficult to restore them when they are destroyed. Therefore, the key issue in sustainable development in general, and water resources management in particular, is to secure the capacity of ecosystems to absorb continuous disturbances, so that they continue to provide the required services. Factoring environmental impacts in flood management activities is, therefore, important within the context of both sustainable development and human security.

II. CONCEPT OF SCIENTIFIC APPROACH

Scientific knowledge of basic concepts concerning the morphology and ecology of rivers and their flood plains is fundamental to understanding the ecosystem processes in a river basin and the impacts of flood management measures on the ecosystems. Environmentally sensitive design, execution and

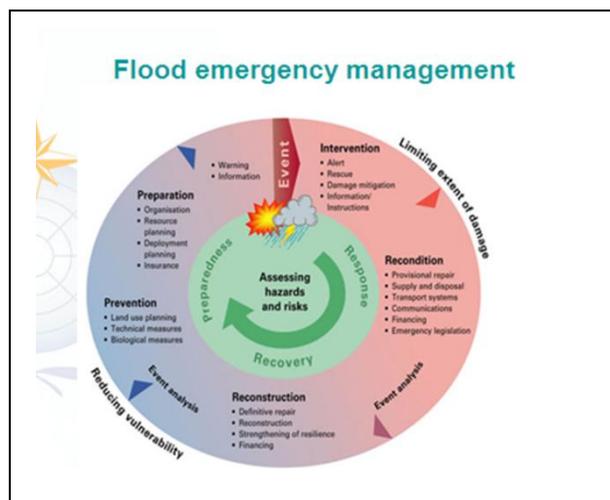
operation of new projects; and mitigation of adverse impacts of existing works through better operation and restoration can be undertaken, only if such scientific concepts are understood. Integrated Flood Management calls for a multidisciplinary approach to flood management, which promotes a dialogue among professionals from various disciplines, coming from different paradigms, to explore shared perceptions and common goals.

III. ENVIRONMENTAL ASSESSMENT

Environmental assessment is a tool to identify the more intensive examination required for decisions that may have significant adverse environmental impacts. Environmental assessment is applied at various levels of decision-making, ranging from policy and planning to project design and implementation. For effective environmental assessment, it is important to start at the strategic level and facilitate a dialogue between environmental and development authorities as well as informed public representatives. Information exchange and utilization, with readily understandable data, facilitate communication among various stakeholders and experts, play a vital role in ensuring close collaboration between the various stakeholders and help in keeping the decision-making process transparent.

IV. FLOOD ASSESSMENT SCIENTIFIC APPROACH

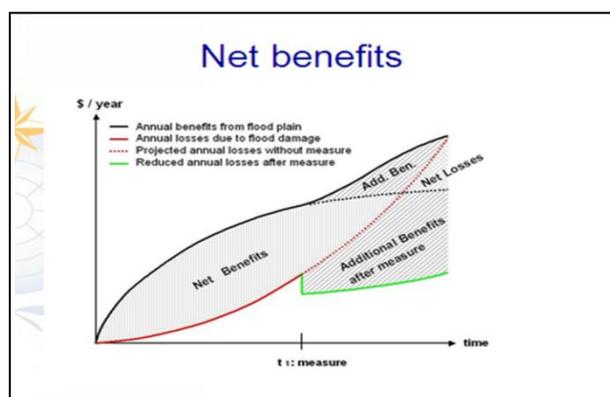
Under natural conditions, rivers continuously migrate across their floodplain belt and change the configuration of the landform. Flow and sediment regimes, interacting with bed and bank materials and with riverine vegetation, create and destroy fluvial features, thereby providing a variety of habitats for diverse biotic communities. River morphology and the diversity and density of habitats are in a state of dynamic equilibrium. Seasonal floodplain inundation is essential to maintaining a complex river corridor (i.e. the river channel and its associated flood plain). Flooding not only allows aquatic organisms to move out of or into the main channel, but also causes morphological change, creates new habitats, deposits silt and fertile organic material, sustains wetlands, renews floodplain ponds, and temporarily stores water on the flood plains, alleviating flooding downstream. Ecological and morphological connectivity across longitudinal (upstream catchment and downstream corridor reaches), lateral (between the river and its flood plain), and vertical (surface with subsurface zones) dimensions need to be maintained with adequate quality and seasonal variability of water flows.



V. FLOOD CONTROL AND INTEGRATED FLOOD MANAGEMENT

Flood and floodplain management play important roles in protecting people and socio-economic development. Until recently, flood control and protection have been engineering-centred, with little or no consideration being given to the social cultural and environmental effects of the selected strategy, nor to long-term economic concerns. They have largely relied on structural solutions (e.g. embankments, bypass channels, dams and reservoirs, etc.), which have unfortunately changed flow regimes, fixed river shape or have separated river channels from their flood plains, resulting in loss of habitats, biological diversity and productivity. During the past half century, flood control and protection have slowly moved from an emphasis on structures towards incorporating complementary non-structural measures such as flood forecasting and land use regulations.

The need for the paradigm shift from flood control to flood management is enshrined in the concept of Integrated Flood Management (IFM) a process promoting an integrated promoting an integrated approach to flood management.



Integrated Flood Management aims at maximizing the net benefits from flood plains and maximizing loss of life from flooding. The essential elements of IFM are:

- Adopting a basin approach to flood management;
- Bringing a multidisciplinary approach in flood management ;
- Reducing vulnerability and risks due to flooding;
- Enabling community involvement; and
- Preserving ecosystems.

Integrated Flood Management addresses issues concerning human security and sustainable development from the perspective of flood management, within the framework of Integrated Water Resources Management.

VI. SUSTAINABLE DEVELOPMENT

The concept of sustainable development is the development that meets the needs of the present, without compromising the ability of future generations to meet their own needs. At the same time, the right to development is an inalienable human right and an integral part of fundamental human freedoms.

VII. THE ENVIRONMENT AND ECOSYSTEMS

The environment can be defined as the surroundings in which an entity operates. This includes air, water, land, natural resources, flora, fauna, humans and their interrelation. The climate, the physical setting and the resulting river flow regimes, set within various ecosystems, with human activities superimposed, determine the environment of a flood plain. Human activities have profound impacts on the various ecosystems within the environment.

An ecosystem is a dynamic system of plant, animal and microorganism communities and their non-living environment, interacting as a functional unit. Ecosystems, such as forests, wetlands and lakes comprise all the organisms present in the area along with their physical, or abiotic, environment and their mutual interactions. An ecosystem has a structure or organization, given by the different interacting living and non-living components.

Environmental degradation and development imperatives

One of the main objectives of IFM is preservation of environment. However, flood management policies are not designed in isolation. Being part of overall sustainable development, they have to appropriately placed within the development matrix. It is, therefore,

important to clearly understand the various drivers of development as well as environmental degradation.

Drivers of environmental degradation

Drivers of environmental degradation differ from country to country depending on the given socio-economic setting. In general, however, they can be traced to poverty and consumerism, agricultural development, industrialization, urbanization, transportation, tourism and population growth. Throughout history, such drivers are ironically, manifested in activities designed to improve livelihoods and economic welfare.

Poverty and consumerism Poverty is the biggest polluter. In order to preserve the natural environment, poverty has to be tackled up front. Feedback links between poverty and environment are extremely complex. Inequality in modern societies may foster unsustainable behaviour because the poor rely on natural resources more than the rich, and have no real prospects of gaining access to other types of resources. The rich on the other hand, with their consumptive behavior exploit natural resources. These impacts are felt globally. In turn, depleted natural resources and degraded environments can accelerate the process of impoverishment, as the poor are deprived of natural assets.

VIII. CONCLUSION

It should be recognized that, within river systems, flooding is the natural way for the system to discharge the water arising from occasional large rainfall events. There is no problem until people decide to use these natural flood plains for socio-economic activities, and realize that protection against inundation is needed. This presents the dilemma of protecting against a natural hazard for the benefit of people who have chosen to live and work in floodplain areas. However, disaster mitigation by restricting the occupation of flood plains limits the potential of these areas for socio-economic development. Most poverty alleviation measures for development and improvement of livelihoods and human security e.g. industrialization, agriculture, flood control and protection works, etc. are drivers of environmental and ecosystem degradation. Accordingly, flood management policies and practices have to be viewed within the overall matrix of drivers of environmental degradation. It is therefore, extremely important to balance development imperatives: flood risks, their relation to social and economic vulnerability and sustainable development vis-à-vis the preservation of ecosystems.

