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A Study on Rethinking the Way of Natural Resources Supports Indian Drought Mitigation

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ABSTRACT

Drought can occur anywhere in the world, and it is considered a transient environmental hazard except in arid geographical regions that historically receive very limited amounts of rainfall. Drought is a natural phenomenon in which levels of rainfall or other types of precipitation are lower than average for an extended period of time, resulting in inadequate water supply. Understanding drought and its impact on people and the environment, however, must take into account differences in geographic regions, local demand for water, and other variables, such as a community's ability to adapt to water shortages and state/local policies that regulate water supply. Climate change is projected to have impacts on increased temperature as well as frequent and intense rainfalls in India. Integrated green infrastructure planning with both structural and non-structural water resources management practices has emerged as a critical climate change adaptation strategy. Drought is unlike other natural emergencies such as hurricanes, floods, or earthquakes; drought-related conditions can take years to escalate to the point at which water supply becomes severely limited, and the length of time that drought conditions may persist and impact societies is unknown. This paper is based on secondary data and the present paper is an endeavor to highlight the Way of Natural Resources Supports Indian Drought Mitigation.

KEY WORDS: Drought Mitigation, Natural Resource Management, Water Conservation, Rainwater Harvesting, Climate Change, Flooding Hazard Mitigation, Green Infrastructure.

1. INTRODUCTION

Drought can occur anywhere in the world, and it is considered a transient environmental hazard except in arid geographical regions that historically receive very limited amounts of rainfall. `Drought affects all parts of our environment as well as our communities. Different types of droughts have varying economic, environmental and social impacts. Approximately 16 per cent of India's geographic area, mostly arid, semi-arid and sub-humid is drought-prone (GoI 2013a). Due to high temporal and spatial variability in rainfall and wide variations in physiographic and climatic conditions in the country, droughts are experienced in varying intensities (moderate or severe) almost every year irrespective of a good monsoon.

India is primarily an agrarian economy and while the sector's contribution to the national Gross Domestic Products (GDP) is gradually declining- from 51.9 per cent in 1950-51 to 13.7 per cent in 2012-13 at 2004-05 prices- it employs over 50% of the population. Adding to the vulnerability is the fact that approximately 56 per cent of the total cropped area is rain-fed (GoI 2013a). Although the country has experienced three major droughts between 2002 and 2012, the capacity to cope with the adverse impacts is steadily increasing due to improved technology

ISSN:0971-1260
Vol-22- Issue-14-December-2019

and irrigation and partly due to diversification of rural economic activities away from pure farm activity (GoI 2013a).
Several policy measures undertaken by the Government of India (GoI) help in building capacity for drought prevention, preparedness, mitigation and management. This has also led to a shift in perception of droughts from a 'crisis of an urgent nature' to a management issue (GoI 2012).

DEFINING DROUGHT

Many definitions of drought exist because the characteristics of drought differ between regions. Drought impacts also vary significantly between locations because of differences in economic, social, and environmental characteristics at the micro and macro scales. Drought definitions should be impact or application specific and region specific. All droughts originate from a deficiency of precipitation. Three types of drought are commonly noted: meteorological, agricultural, and hydrological. Although drought most commonly is defined climatologically, drought can also be exacerbated by human activities. For example, even when precipitation is occurring at average rates within a specific area, urban expansion and development without regard to existing water supply and water system capacity can trigger a human-induced drought.

2. OBJECTIVES, METHODS AND MATERIALS

The present paper is an endeavor to highlight the Way of Natural Resources Supports Indian Drought Mitigation. This paper is based on secondary data, primarily through literature, study of journals, articles and textual analysis and website. Overall this exploratory research tries to explore the existing condition of the variables and Way of Natural Resources Supports Indian Drought Mitigation. Qualitative research approaches and procedures have been applied to explore pertinent information for this study.

HISTORYOF DROUGHT

In the past, droughts have periodically led to major Indian famines, including the Bengal famine of 1770, in which up to one third of the population in affected areas died; The 1876–1877 famine, in which over five million people died; and the 1899 famine, in which over 4.5 million died.

IMPACT OF EL NIÑO

All such episodes of severe drought correlate with El Niño Southern Oscillation (ENSO) events. An irregularly periodical climate change caused by variations in sea surface temperatures over the tropical eastern Pacific Ocean, affecting much of the tropics and subtropics is known as **El Niño**
Southern Oscillation (**ENSO**). El Niño related droughts have also been implicated in periodic declines in Indian agricultural output. Nevertheless, ENSO events that have coincided with abnormally high sea surfaces temperatures in the Indian Ocean in one instance during 1997 and 1998 by up to 3 °C (5 °F) have resulted in increased oceanic evaporation, resulting in unusually wet weather across India. Such anomalies have occurred during a sustained warm spell that began in the 1990s.A contrasting phenomenon is that, instead of the usual high pressure air mass over the southern Indian Ocean, an ENSO related oceanic low pressure convergence center forms; It then continually pulls dry air from Central Asia, desiccating India during what should have been the humid summer monsoon season. This reversed air flow causes India's

ISSN:0971-1260
Vol-22- Issue-14-December-2019

droughts. The extent that an ENSO event raises sea surface temperatures in the central Pacific Ocean influences the degree of drought. Around 43 per cent of El Niño events are followed by drought in India.

DROUGHT IN WORLD

Disasters such as floods, storms, heat waves and droughts may have serious implications for human health and the economic development of countries. One of the main findings of this report is that disaster burdens are dominated by economic and demographic developments, rather than climate change. Furthermore, disaster burden appears to be spread unequally over rich and poor countries. Examples of severe disaster impacts are the drought in Ethiopia and Sudan in 1983, which caused over 400,000 people to die of starvation; Drought in India and floods in China in 2002, which affected 450 million people, and Hurricane Katrina and subsequent flooding in the United States in 2005, which led to economic damages valued at USD 140 billion. This report places severe disaster consequences in a statistical context, as part the OECD Environmental Outlook to 2050. Analyses were performed using the CRED database EMDAT.

DROUGHT IN INDIA

Drought in India has resulted in tens of millions of deaths over the course of the 18th, 19th, and 20th centuries. Indian agriculture is heavily dependent on the climate of India: a favorable southwest summer monsoon is critical in securing water for irrigating Indian crops. In some parts of India, the failure of the monsoons result in water shortages, resulting in below average crop yields. This is particularly true of major drought prone regions such as southern and eastern Maharashtra, northern Karnataka, Andhra Pradesh, Odisha, Gujarat, and Telangana Rajasthan's

MAJOR DROUGHT PRONE REGIONS OF INDIA

India has suffered major and worst drought over the 18th and 19th centuries, resulted millions of deaths and led to major Indian famines such as Odisha famine of 1866,Bengal famine of 1943 and Bihar famine of 1873–1874. States affected by drought in India are Maharashtra, Karnataka, Andhra Pradesh, Orissa, Gujarat and Rajasthan, Major population of these region depended on the rice crop of the winter season. Due to the failure of the monsoon, some parts of Bihar and Jharkhand along with Punjab and Haryana were also affected by drought.

THE IMPACT OF DROUGHTS IN INDIA

The Impact Of Droughts In India Can Be Summed Up Under The Following Headings:

PHYSICAL IMPACT

Meteorological drought adversely affects the recharge of soil moisture, surface runoff and ground water table. Soils dry up, surface runoff is reduced and ground water level is lowered. Rivers, lakes, ponds and reservoirs tend to dry up wells and tube-wells are rendered unserviceable due to lowering of the ground water table.

ISSN:0971-1260
Vol-22- Issue-14-December-2019

IMPACT ON AGRICULTURE

Indian agriculture still largely depends upon monsoon rainfall where about two-thirds of the arable land lack irrigation facilities and is termed as rain fed. The effect is manifested in the shortfalls of agricultural production in drought years. History is replete with examples of serious shortfall in Cultivated areas and drop in agricultural productivity. Severe shortage of food-grains had been felt and the country had to resort to import of food grains to save the poor people from hunger and starvation. However, India has been able to build a buffer stock of food grains and threat from droughts is not as serious as it used to be before the Green Revolution. It is worth mentioning here that the shortfall in agricultural production may be the direct impact of meteorological droughts but the succeeding hydrological and agricultural droughts have a long range and far reaching impact on agriculture. This impact may be in the form of changes in the cropping patterns and impoverishment in cattle.

PRACTICES TO ALLEVIATE DROUGHT IMPACTS

Several of the programmes of the GoI help build resilience of communities against drought. Since 2005, there has been a paradigm shift from the erstwhile relief-centric response to a proactive prevention, mitigation and preparedness-driven approach for conserving developmental gains and also to minimise loss of life, livelihood and property (GoI 2010).The National Mission for Green India, one of the eight missions under India's National Action Plan on Climate Change, aims at improving the quality of forest cover in 5 mha and creating new forest cover in another 5mha over 10 year period with a project cost of about US$ 8 billion. Currently, there is an outlay of US$ 2.14 billion, for a period of 2012-17, to address 2.8 m ha of predominantly degraded lands and help restore multiple ecosystem services as well as enhance livelihoods of the households dependent on these lands. The Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS), a flagship employment guarantee program with an annual outlay of appox. US$ 8.23 billion has a strong focus on land, water and forestation activities. Similarly the Integrated Watershed Management Programme (IWMP) has targeted development of 75 million hectares of rain fed/degraded area in a phased manner during 2007-2027. For 2013-14, IWMP has an outlay of US$0.88 billion. India’s draft National Water Policy (MoWR 2012) seeks address issues such as the scarcity of water, inequities in its distribution and the lack of a unified perspective in planning, management and use of water resources. Other key programmes of the GoI that help build resilience of drought affected people include the National Watershed Development Project for Rain fed Areas, National Food Security Mission, National Horticulture Mission and Rashtriya Krishi Vikas Yojana, National Mission on Micro Irrigation. The possibility of reorienting regular development programmes of the Central and State governments are also being explored.

There is tremendous potential for harnessing the Indigenous Technical Knowledge (ITK) for alleviating drought impacts. India is endowed with a rich repository of knowledge relating to cloud formation, lightning, wind direction, rains and drought which has evolved over centuries to perceive and manage natural disasters and extreme weather events by disaster prediction, response, mitigation, and effects of weather on crops (Gupta & Singh 2011; Pareek & Trivedi 2011). This vast and time-tested ITK on natural resource management can be extrapolated to understand the modern concepts of disaster risk management in terms of early warning, preparedness, mitigation, response and relief (Gupta & Singh 2011).

ISSN:0971-1260
Vol-22- Issue-14-December-2019

WATER RESOURCES

The water resources that contribute most to human quality of life and to ecosystem balance are groundwater and surface water. The term “surface water” refers to water that can be accessed at the earth’s surface, which includes water from ponds, lakes, streams, and oceans. In contrast, Groundwater is water that is found beneath the earth’s surface in geologic formations. Groundwater can b replenished through precipitation, and it can naturally reemerge at the earth’s surface through springs, geysers, and seepage or can be mechanically pumped from below through the use of wells.

WATER CONSERVATION AND DROUGHT MITIGATION PLANNING

"Water conservation" means water use efficiency, wise water use, water transmission and distribution system efficiency, and supply substitution. The objective of water conservation is a long-term increase in the productive use of water supply in order to satisfy water supply needs without compromising desired water services. Water is the lifeblood of India. We depend on it, we value it, and with growing awareness of the potential impacts of population growth, climate change and other pressures on our water resources and watersheds, we must plan in order to effectively manage and steward our water resources long into the future. Water enables the ecosystems; culture and societies of India to survive thrive and flourish. The future of species, ecosystems, societies, districts, states, countries and future generations will undoubtedly be influenced, in large part, by how we manage this precious resource.

Planning plays a critical role in how societies define their vision of the future and their path to achieve that vision. Planning can be reactive or responsive, helping to make course corrections in response to existing issues and challenges. It can also be proactive in anticipating emerging issues on the horizon and helping societies to prepare for and manage those issues. When it comes to societies and watersheds, there may be as many different approaches to planning, as there are societies.

GREEN INFRASTRUCTURE AND WATER RESOURCE MITIGATION

Green infrastructure, in Place of grey infrastructure, is a system that “uses natural systems—or engineered systems that mimic natural processes—to enhance overall environmental quality and provide utility services” (EPA, 2012). The concept of preserving natural areas and using ecological design for protecting, enhancing, and restoring ecosystem services in order to improve environmental quality and provide hazard mitigation is fundamental in the concept of green infrastructure (Fabos, 1995; Benedict and McMahon, 2006; McDonald et al., 2005; Ahern, 2007). Its origin lies in the paradigm of “design with nature”, which integrates natural resources and hazard assessment in order to design sensibly and responsibly with the environment (McHarg, 1969).

Best management practices (BMPs) (Urbonas, 1994) emphasize ecological engineering design including detention basins, infiltration trenches and wells, vegetated swales and rain gardens, vegetated buffer strips, porous pavements, constructed wetlands and green roofs. Non-structural BMPs emphasize policy and regulations that help to alleviate the root of the problem—urbanization—and to engage the public. These include, but are not limited to, land use planning, natural resource management, streams and wetlands restoration, management of

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Vol-22- Issue-14-December-2019

household chemicals, on-site programs of runoff management and flood insurance (Ellis and Marsalek, 1996; Ellis, 2012).

In summary, urbanization alters the natural hydrological cycle, which is further impacted by climate change. The changing water cycle, particularly in urbanized watersheds, affects the ability of water management programs to restore watersheds to their pre-development states. Therefore, it is critical to explore innovations in water management practices in order to maximize their ability to mitigate urbanization impacts while in the mean time serving as climate change adaptation strategy for communities.

RAINWATER HARVESTING AND DECENTRALISED WASTEWATER TREATMENT

The increase in urbanisation has led to increase in the fresh water demand along with wastewater generation. The current water crisis is attributed to mismanagement of water resources and emphasis on the energy as well as resource intensive centralised urban water management. Need is, for the practitioners and user communities, to implement sustainable and affordable decentralised water management practices. This short term four day course will focus on – designing rainwater harvesting (RWH) and decentralised wastewater treatment (DWWT) systems including local reuse. Registration to this popular course is on first come first basis. For Alumni list of our previous courses.

3. CONCLUSION AND SUGGESTIONS

While India has strong drought assessment capabilities, there is need to enhance capacity for early warning and impact monitoring, particularly in the light of climate change impacts, which can further compound the challenge of drought monitoring for early warnings because of wide variability in rainfall pattern even at local levels. Lack of adequate drought monitoring systems and the capacity to respond via appropriate political, institutional, and technological frameworks, inhibit the development of integrated drought management plans or early warning systems. There is need of top-down approach to provide national real-time drought monitoring and seasonal forecasting, and a bottom-up approach that builds upon existing regional and local systems to provide national coverage.

4. REFERENCES

[1] priyanka kakodkar (2015), “maharashtra decares drought in 14,708 villages”, the times of India, 17 october 2015.
[2] Kull, D, Mechler, R & Hochrainer-Stigler, S (2013), 'Probabilistic cost-benefit analysis of disaster risk
[3] Pareek, A & Trivedi, PC (2011), 'Cultural values and indigenous knowledge of climate change and disaster prediction in Rajasthan, India', Indian Journal of Traditional Knowledge, vol. 10, no. 1, pp. 183-9.
[4] Murthy C.S. & Sesha Sai M.V.R. (20100,‘Agricultural Drought Monitoring and Assesment’. In Roy P.S,
[5] Bandyopadhyay S.K (2009), ‘Linking future climate change with drought in development planning for preparedness and mitigation’.In: Abstract of Second India Disaster Management Congress, New Delhi. National Institute of Disaster Management, New Delhi

ISSN:0971-1260
Vol-22- Issue-14-December-2019

[6] Olsson, P., Folke, C., Berkes, F., (2004). Adaptive comanagement for building resilience in social-ecological systems. Environmental Management 34, 75–90.
[7] Klein, R.J.T., (2003). Adaptation to climate variability and change: what is optimal and appropriate? In: Giupponi, C., Schechter, M. (Eds.), Climate Change in the Mediterranean: Socio-Economic Perspectives of Impacts, Vulnerability and Adaptation. Edward Elgar, Cheltenham, UK, pp. 32–50.
[8] Dessai, S., Hulme, M., (2001). Climatic implications of revised IPCC emission scenarios, the Kyoto Protocol and quantification of uncertainties. Integr. Assess. 2 (3), 159–170.
[9] Woolcock, M., (1998). Social capital and economic development: toward a theoretical synthesis and policy framework. Theory and Society 27, 151–208.
[10] Wilhite, D.A., (1993). Planning for drought: a methodology. In: Wilhite, D.A. (Ed.), Drought Assessment, Management, and Planning: Theory and Case Studies. Kluwer Academic Publishers, Boston, pp. 87–108.
[11] Heathcote, R., (1973). Drought perception. In: Lovett, J. (Ed.), The Environmental, Economic and Social Significance of Drought. Angus and Robertson, Sydney, pp. 17–40.
[12] http://www.walkthroughindia.com
[13] http://www.sitemaker.umich.edu
[14] http://www.ga.water.usgs.gov