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Improving the Welfare Effects

Nitin Bassi
&
M. Dinesh Kumar

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INSTITUTE FOR RESOURCE ANALYSIS AND POLICY
202, Riviera, Dwarakapuri Colony, Punjagutta, Hyderabad - 500 082
Tel: 91-40-4261 7392 E-mail: info@irapindia.org www.irapindia.org

NREGA AND RURAL WATER MANAGEMENT IN INDIA:
Improving the Welfare Effects

Nitin Bassi
Senior Researcher, Institute for Resource Analysis and Policy (IRAP) bassi43@gmail.com; nitinbassi@irapindia.org
And
M. Dinesh Kumar
Executive Director, Institute for Resource Analysis and Policy (IRAP) dinesh@irapindia.org; dineshcgiar@gmail.com

Abstract

NREGA is being eulogized by many in the academic, development and policy arena as a "silver bullet" for eradicating rural poverty and unemployment, by way of generating demand for productive labour force in villages and private incentives for management of common property resources. The paper argues that the nature of water management activities chosen under the scheme and the callous way in which these activities are planned and implemented in different regions, without any consideration to their physical and socio-economic realities of the regions concerned, are creating several negative welfare effects. The paper identifies three broad and distinct regional typologies in India for deciding the nature of water management interventions for different regions, and proposes the types for water management works under NREGS for each typology, which has the potential to generate labour demand, while producing welfare effects.

1. BACKGROUND

Rural poverty and unemployment in India have grown in an unprecedented manner during the last few decades. There is a growing incidence of rural youth shifting from agriculture into unproductive activities, compounding this problem. In order to reverse this trend and to provide livelihood security to the rural unemployed, Government of India (GOI) enacted the National Rural Employment Guarantee Act (NREGA)[1] , 2005. The act provides for 100 days of guaranteed employment to every rural household in a financial year for unskilled manual work. The Act initially notified in 200 districts, at present covers 619 districts (99% of the districts in the country) and expected to benefit some 5.5 crore poorest households in the year 2009-10 (Sharma 2009). With the budget allocation of Rs. 11,300 crore in 2006-07[2] , under the umbrella of the NREGA, this is probably the largest rights-based social protection initiative in the world (Farrington et al. 2007). As per the Schedule I of the Act, the work under National Rural Employment Guarantee Scheme (NREGS) will be essentially creation of sustainable rural assets.

The NREGA builds on earlier experience with Employment Guarantee Scheme (EGS) in Maharashtra (Sjoblom and Farrington 2008). The key component of NREGA is the provision of employment by the state at a prescribed wage for those unable to find alternative employment, which provides a form of social safety net to the rural unemployed people. Long term objectives of the scheme includes; a) enhancement of livelihood security in rural areas, b) creating productive assets, c) protecting the environment, d) empowering rural women and, e) fostering social equity. Apart from affirming the 'right to work', the Act also seeks to ensure that the poor have a say in decisions on the works to be undertaken, so that such works contribute to improvement in their livelihoods (McCord and Farrington 2008).

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[1] Rechristened as Mahatma Gandhi National Rural Employment Guarantee Act from October, 2009 onwards.

[2] The budgetary allocation for NREGA has increased to Rs. 40,100 crore for 2010-11.

2. WATER MANAGEMENT UNDER NREGS

Works related to water & soil conservation, afforestation and land development were given top priority under the NREGS. The water management (WM) works specifically includes; a) water conservation and water harvesting; b) drought proofing; c) irrigation canals; d) provision of irrigation facility to land owned by households belonging to SC/ST or to land of the beneficiaries of land Reforms/Indira Awas Yojana/BPL families; e) renovation of traditional water bodies; f) land development; and, g) flood-control and protection works (GOI 2008). During past three years (2006-07 to 2008-09) more than 31.44lac water management related works have been completed with a total expenditure of 35.9 thousand crore (Table 1) (Sharma 2009). Of these, maximum number of works was undertaken on water conservation and water harvesting.

Table 1: Water management works under NREGS (from 2006-07 to 2008-09)

Category of Water Management Works	**Type of Work Undertaken under each Category***	**Expenditure per Work Undertaken (000' Rs.)**	**Benefit Created per Work Undertaken**
Water conservation and water harvesting	Digging of new tanks/ ponds, percolation tanks, small check dams	160.80	276.43 Cu Mt.
Drought proofing	Afforestation and tree plantation	147.06	3.68 Hectare
Irrigation canals	Minor irrigation canals	118.18	0.45 Km
Provision of irrigation facility to land owned by HH of SC/ST OR IAY/ BPL beneficiaries	Digging of farm pond	39.16	0.26 Hectare
Renovation of traditional water bodies	De-silting of tanks/ponds, de-silting of old canals, traditional open well	207.10	804.73 Cu Mt.
Flood-control and protection works embankment	Drainage in water logged areas, construction & repair of	------- -------	------ ------
Land development	Plantation and land leveling	73.44	3.12 Hectare

*List may not be inclusive

The statistics provided in Table 1 do not include the money, time and labour spent on uncompleted works. Further, the completion rate of various WM interventions (as a % of total works undertaken) does not show very encouraging results. Between 2006-07 and 2008-09, no significant improvement in work completion rate has been witnessed, with highest being achieved in flood control and protection works (Figure 1). Data available for 2009-10 (till October 2009) on work completion rate show alarming trend, with only 26% of the WM works completed out of total of 21.52lac pieces of work taken up. Partly, this can be attributed to the occurrence of monsoon during which not much work is possible. Still, there is need for major improvement on this front.

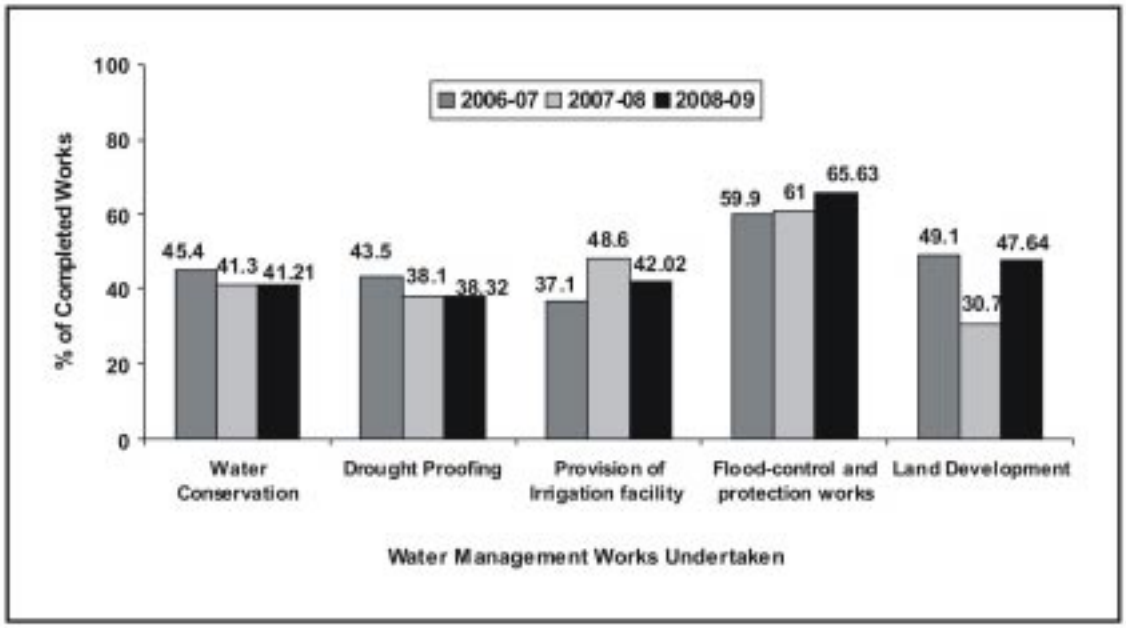

Figure 1: Year wise completion rate of water management works under NREGS[3]
(Source: Data compiled from MoRD statistics and NCAER-PIF Study 2009)

Considering the nature and size of the WM works undertaken, many believe that NREGS would yield a remarkable impact on rural water management, providing water security in some water-deficit areas (see for instance Shah 2010) and protecting some other areas from devastation caused by floods. However, initial evidences suggest that neither the nature nor the quality of assets created under the water management works is satisfactory. The reason for this is quite clear. Little consideration is given to the social, economic and hydrological aspects while selecting different water related works. Focus of the WM works was more on creation of standardized set of assets with little consideration for local relevance.

From a poverty-reduction viewpoint, one of the most fundamental criticisms of NREGA is that, the type of WM activities for which work can be funded (e.g. water conservation, land development, affor¬estation, provision of irrigation systems, or flood control) are prone to being taken over by wealthier sections of society. Also, poor implementation of many of NREGS works led beneficiaries think that it is no better than any other government schemes that have had little impact on poverty (Sjoblom and Farrington 2008). Absence of proper social audits has further aggravated the problem. On human resources development front, NREGS works doesn't provide skills enhancement and therefore does little to strengthen human capital. In addition, by taking work directly to the people, the scheme may discourage them from moving to more economically dynamic areas (Farrington et al. 2007).

[3] Water conservation works shown in Figure 1 also includes works related to water harvesting, irrigation canals and renovation of traditional water bodies

3. EMERGING ISSUES

Implementing WM works under NREGA on the scale envisaged has posed major challenges. Field evidences suggest that spending on some of the water management works has not only been inadequate, but also unwise. For instance ponds have been dug in areas with scanty rainfall, without conceptualization of factors such as catchments area and sources of recharging (NCAER-PIF 2009). As a matter of fact, residual catchments are hard to find. This issue is particularly important in naturally water-scarce regions, where already a large number of small and large water impounding structures exist, including those which are traditional and modern. The flows generated from the natural catchments are already committed for the small and large reservoirs downstream (Kumar et al. 2008). As a result of it, construction of new structures in the upper catchments produces negative effects downstream, in the form of reduced flows into tanks and reservoirs (Bachelor et al. 2002; Kumar et al. 2008).

No geo-hydrological investigations are undertaken for initiating activities which are intended to be groundwater recharge schemes[4] . Not only that the provision of funds for doing such investigations is an issue, but also the availability of scientific and technical manpower on such a large-scale in rural areas is questionable. The recent landslides in Kozhikode district of Kerala is a pointer to the impending catastrophe such activities can invite when done on a haphazard manner. Unscrupulous digging of rainwater harvesting pits on hill slopes in this high rainfall area (with an rainfall of around 3000mm, 80% of which occurring during the monsoon months) was reported to have caused de-stabilizing of slopes, which eventually led to landslides.

In some cases expenditure was found to have been incurred on non-existent projects (NCAER-PIF 2009). At several places emphasis is more on spending a larger amount of money than on ensuring quality works. After Ambasta et al. (2008), in some districts of Chhattisgarh, planting was done but no provision was made for either watering or protection (mainly from grazing) of plantation whereas in few districts of Madhya Pradesh, farm bunding had been initiated without any proper technical planning. In some other tribal districts of Chhattisgarh, works were focused mainly on activities for which standardized estimates were available. Thus plans are made and approved for implementation in "top down" manner. As a consequence major portion of the approved funds were utilized on roads, where drought proofing should have been given top priority considering the area to be one of the poorest tribal pockets of the country, with a long history of droughts. The hydrology and topography of these areas is naturally suited to watershed works too, but these remained far off from the priority of NREGA plans in the state (Ambasta et al. 2008). Such poor implementation strategies stems from lack of understanding of the interaction between: various components of the hydrological system viz., surface water, groundwater and catchments; and various environmental resources such as land, water and trees.

Further, failure to understand the rural labour markets has led to serious negative impacts on food security for the small and marginal farmers. It has been argued that NREGS led to withdrawal of section of labor force to work on projects of uncertain value that resulted in market distortion (wage increase). Agricultural activity of those who rely on hired workers, including small and marginal farmers who survive on small margins of profits has also been affected (Panagariya 2009). Plight of Punjab farmers, who are dependent heavily on farm hands from eastern and central India to work on their fields, has been reported. Since they

[4] There are a few exceptions to this. Some NGOs are involved in geo-hydrological investigations to map aquifers for identifying locations for building recharge schemes. They include: ACT (Arid Communities and Technologies), Kachchh; and ACWADAM, Pune.

have stopped getting labourers from central India, the demand for labourers from eastern India has gone up. This shortage of migrant labourers from central India is attributed mainly to the jobs created back home under the NREGS. As a result of the increased demand for labour, the seasonal wage rate in Punjab has increased three-fold from a mere Rs. 700 to Rs. 2,000-2,500 per acre, in just about 2 years (Source: Times of India, 13th June, 2010).

Ambasta et al. (2008) argued that it would be highly optimistic to consider NREGA to do any better when its implementation is delegated to the same ossified, decaying structure that has deeply institutionalized corruption, inefficiency and non-accountability into the very fabric of Indian democracy at the grass roots.

4. EFFECTIVENESS OF THE WM INTERVENTIONS: A CRITICAL REVIEW

In this section, we start with the basic premise that integrating hydrological and economic consideration in planning water related works is extremely crucial for the success of NREGS in terms of reducing negative welfare effects and improving land and water management in terms of augmenting water resources in rural areas, that is capable of strengthening food and livelihood security. With this backdrop, we would be commenting on the key interventions undertaken under the scheme.

With increasing natural and man-made disasters, flood protection and control have become increasingly important. India has been tackling the problem of floods through structural and non-structural measures. While non-structural measures like flood forecasting aim at improving the preparedness to floods, structural measures involve the construction of embankments, dams, drainage channels, and reservoirs that prevent floodwaters from reaching potential damage centres (Gupta et al. 2003). However, these efforts have provided little solace and there is a recurrent large-scale economic & human loss during floods in the Gangetic and Brahmaputra basins. Based on the analysis of data for three highly vulnerable states in the eastern region of India, Gupta et al. (2003) argued that flood protection measures have been inadequate in controlling losses and reducing vulnerability.

Understanding flood management requires study of hydrology, open channel hydraulics, and river morphology. Constructing embankment for flood control is one of the cheapest and fastest executable options for flood protection. However, embankments can create drainage difficulties in the country-side and induce a sense of security that reduces the level of alertness amongst the populace (Pandit 2009). Thus embankments require careful maintenance works and stabilization works. Stabilization works can be done through plantation of trees on the embankments. Dams and reservoirs are the best flood control structural measures but they can only be constructed by skilled workforce under the supervision of trained professionals. Therefore, they cannot be within the purview of NREGA, as it stands today. However, measures to stop soil erosion & silting up of existing reservoirs can be undertaken as a part of scheme WM works.

As regards water harvesting interventions, there is a growing concern over its economic viability and downstream impacts. Planning of local water harvesting/groundwater recharge schemes is not backed by proper hydrological and economic analysis. Therefore, there is hardly any knowledge of the cost per cubic

metre of the harvested water through such schemes. This issue of economic viability becomes far more serious as these schemes are largely implemented in semi-arid and arid regions. The reason is that these regions have extremely limited runoff potential, with high inter-annual variability. Studies show that rain water harvesting has limited potential to reduce the demand-supply imbalances and provide reliable supplies (see for instance Kumar et al. 2006; Kumar et al. 2008); and is economically unviable (Kumar et al. 2008) in water-scarce regions. Further, in these water scarce regions, runoff harvesting does not offer any potential for augmenting the supplies at basin level, and instead creates huge negative economic (Kumar et al. 2008; Ray and Bijarnia 2006), social and environmental externalities (Kumar et al. 2008) downstream. Harvested rainfall may also increase depletion, reducing downstream users' access to water from streams or groundwater. This loss of downstream access to the water may be severe and irreversible, if the entire water is consumed by crops or growth of other vegetation (Baron 2009).

Water harvesting at the local level would make better sense if scientific inputs are considered into planning of these interventions. These inputs include: analysis of rainfall intensity and pattern; reliable estimates of run-off from the catchments; analysis of engineering properties of the soils; topography; and, geo-hydrological data including geo-hydrological parameters of the formations, mapping of geological structures & groundwater-surface water interactions (Kumar et al. 2006). This would help in designing optimally sized structures, thereby saving the scarce financial resources.

Further, at the basin level, such schemes would need careful hydrological and economic planning, including assessment of un-utilized runoff available for further harnessing. This should lead to determining the optimum number of structures which can be built to have positive hydrological and economic impacts. Unplanned and unscrupulous building of water harvesting structures by village communities without due consideration to the basin's uncommitted stream-flows would only result in re-distribution of water across the basin, with negative social and ecological consequences for downstream areas as they dry up local streams and reduce the flows into existing reservoirs meant for irrigation and drinking purpose. The recent evidences from Saurashtra (Aji reservoir in Rajkot) and Rajasthan of drying up of public reservoirs are just an indication of the larger menace if necessary caution is not exercised in implementing water harvesting schemes in villages. Infact in 2006, Government of Rajasthan has threatened legal action against Government of Madhya Pradesh for the latter's refusal to dismantle hundreds of illegally constructed check dams/water harvesting structures (WHS) along the Chambal river in the Malwa region. Rajasthan government felt that due to these structures the inflow of water into the Gandhi Sagar Dam has reduced. As per one estimate, total number of WHS constructed in the catchment area exceeds 1500 and includes structures that were built by villagers and NGO's under watershed projects (Source: Indian Express 20/06/06).Contrary to the concerns of downstream users, under NREGS, several hundreds of villages from the same region embark on activities like digging up of tanks and ponds in the villages, without recognizing the aggregate impacts on downstream water bodies.

There is a general belief that afforestation would improve hydrological regime in water-scarce regions. This is a dangerous misconception. Trees require water for physiological processes in the form of evapo-transpiration (ET) more than conventional field crops, and saplings require artificial application of water for their protection in semi arid and arid areas which experience erratic rainfall, as their limited root system does not allow them to take water from deeper soil strata (vadoze zone). Soil moisture for survival of sapling is difficult to manage

in semi arid areas on a sustainable basis. There are two reasons for this: a) afforestation activity is generally taken up in wasteland and pasture land, which are away from prime agricultural land, making the access to irrigation sources difficult; and, b) most semi arid regions in India experience very high variability in rainfall and rainy days, and generally years of low rainfall are characterized by fewer rainy days, which means long dry spells in years of low rainfall (Kumar et al. 2008; Pisharoty 1990). Hence, they are two predictable outcomes of afforestation programmes in such cases. First: overall survival rate of saplings becomes very low. Second: we deplete the available freshwater supplies to keep the survival of sapling high.

On-farm water management and renovation of traditional water bodies can be suitable for drought proofing in these semi-arid and arid regions. Normally, any meteorological drought will translate into a hydrological drought marked by reduced surface water and resultant negative impact on groundwater recharge (Kumar et al. 2009). Therefore, the available water will have to be used more efficiently. On-farm water management will prove to be beneficial for drought proofing. Under NREGS, technical interventions like field leveling, and rehabilitation of earthen canals including their de-silting and lining will be more suitable for reducing wastage of irrigation water, thereby achieving water demand management. It is important to mention here that in arid and semi arid regions, prevention of water wastage occurring through deep percolation of irrigation water in the field can potentially lead to real or "wet" water saving (Kumar 2009). So is the case with prevention of seepage from canals (Please see Seckler 1996 for definitions of "dry" and "wet" water saving).

Normally, under the name of renovation, capacity enhancement work of traditional water bodies such as tanks and ponds, including digging of earth and raising embankments is taken up. Mostly, earth moving machinery is employed in executing this work. Whereas, the earthwork like this gets reported under human labour. Our recent fieldwork in Pali district of northern Rajasthan suggests that there is widespread manipulation of the work at site under NREGS. The nexus between the labourers enrolled for NREGA work and the local contractors make it possible for labourers to claim wages on the basis of the volume of earthwork completed on ground, which is actually executed with the use of large earth moving machinery. The labourers in turn pay a portion of the receipts to the contractors based on the machine labour employed. In reality, the labourers never go to the site and execute the work themselves.

This practice of using moving machinery has two negative outcomes. 1. There is overdoing of earthwork. Unlike with human labour, scrapping of silt is not possible with earth-moving machinery. 2. The original shape of the water body is permanently lost, and the embankment slope is destabilized, resulting in increased rate of siltation of the water body. On the other hand, such activities do not help in improving water management during droughts as tank inflows will be much less during drought years as compared to normal years. Instead, what is required is embankment protection using compaction and pitching, and construction of waste weir. Breaching of tank embankments and flooding of surrounding fields is a common seen in South Indian villages. Serious irregularities in the implementation of NREGS in Rajasthan and massive corruption that threatens to destroy the real aims of rural decentralization has also been acknowledged by Aruna Roy, member of National Advisory Council (Source: TOI, 13th September, 2010).

5. FUTURE STRATEGIES FOR LAND AND WATER MANAGEMENT UNDER NREGS

The foregoing discussion leads us to three broad typologies to determine the priorities vis-à-vis the type of land and water based interventions that are appropriate to be considered under NREGS that take into agro-climatic, hydrological and geological factors. For each typology, the types of water management activities that can be taken up under NREGS are described.

The three typologies include (Figure 2):

1) Naturally and physically water abundant region, comprising the Gangetic plains region of Bihar, Uttar Pradesh and West Bengal; eastern plateau region; east coast plains region of Orissa. Region experiences sub-humid climate with heavy annual rainfall ranging from 1000 to 2000 mm. Soil is alluvial and in some places red and yellow deltaic. The unconsolidated hydro-geological formations in this zone have rainfall infiltration factor ranging from 0.08 to 0.25.

2) Naturally water abundant but physically water scarce region, comprising western and eastern Himalayan region; west coast plains and hills region of Maharashtra, Karnataka and Kerala. Humid climate with very heavy annual rainfall, some areas receiving more than 5000 mm. Soil type is mainly hill alluvial and brown hill soil. Mostly hilly areas with steep slopes and semi-consolidated formations characterized with low ground water potential are included in this.

3) Naturally and physically water scarce region, comprising Punjab, Haryana and Rajasthan; central, western and southern Plateau region; Gujarat plains and western dry regions. Arid and semi-arid climate with very low average mean annual rainfall (400-600 mm), even 100 mm at few places. Soil types are black soil, red sandy, coastal and sandy alluvial. This zone is characterized by presence of consolidated and semi-consolidated formations. Rainfall infiltration factor is as low as 0.01 in some areas.

Flood control and protection works as WM intervention will be highly effective in regions which are both "naturally water abundant" and have surplus water resources from the point of view of availability and demand. These areas are characterized by high to moderate rainfall, easy access to the available water resources (both surface and groundwater) and low water demands. However adequate financial resources to access water are not available with the populations living in there, causing economic water scarcity. Most part of eastern India fall under this category. The flood control and protection works that can be undertaken include embankment construction, embankment stabilization through afforestation, and measures to stop soil erosion & silting up of existing reservoirs. A recent learning from Bihar shows that social afforestation program undertaken by the State forest department is extremely successful in six participating districts not only from the point of developing wastelands but also from the point of view of providing gainful employment to the rural landless families (see Gupta 2009). The villagers can be given the rights to harvest timber from the forest, once the trees mature. From a hydrological point of view, creating a forest cover improves the hydrological regime, by reducing the peak runoff rates, and increasing the evaporation from the shallow groundwater. This can have some positive effects on controlling floods in regions like the Gangetic-Brahmaputra basins, and reducing problems of water logging in high water table areas.

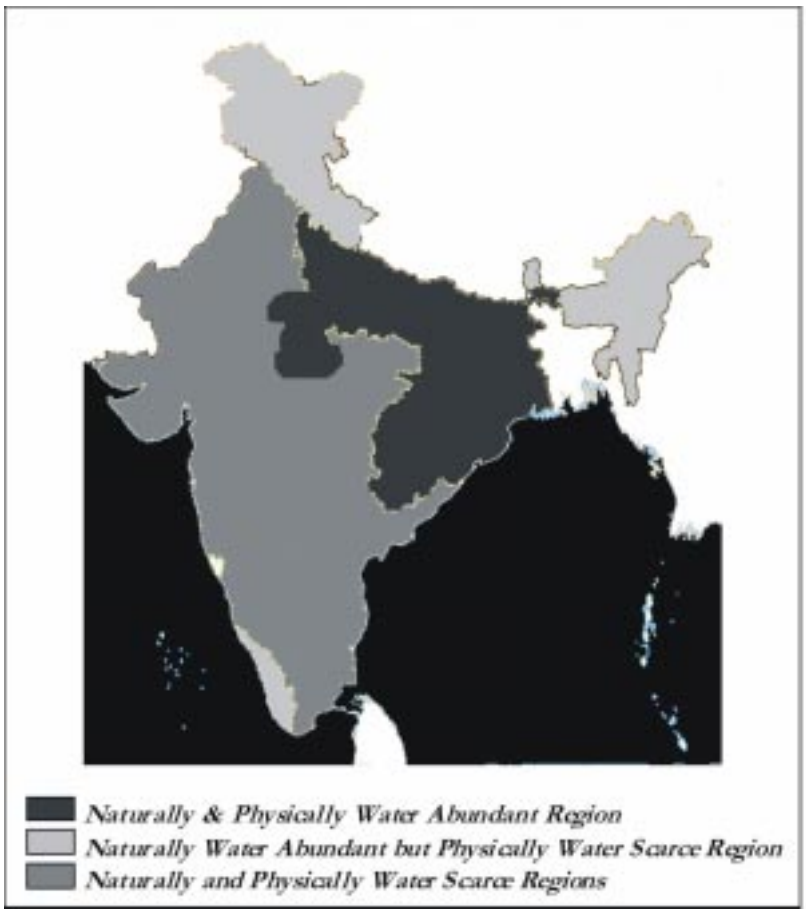

Figure 2: Map showing water abundance and scarcity in different parts of India

Works related to runoff water harvesting and provision of irrigation facility to land owned by economically weak classes can be best suited for regions which are naturally water rich but physically water scarce. This region covers the northern and north-eastern India. The landscape in these areas is mostly hilly and even after receiving good rainfall much of the water is lost as runoff. Such regions are perfect for surface water harvesting or creating impoundments. But, before undertaking these interventions, proper geo-technical studies should be carried out to prevent undesirable consequences such as landslides. Soil and water management interventions including continuous bunding, drainage control and gully plugging (watershed management approach) are equally effective in these regions. Small on-farm storages can also be constructed in these hilly areas to provide irrigation facilities on the farmers' agricultural field.

Renovation of traditional water bodies and on-farm water management can be an important intervention in naturally water-scarce areas which experience physical water scarcity, owing to water demands far exceeding the total water renewable water resources. Such regions in India are characterized by variable rainfall and high evaporation rates. Most parts of western, north-western central and peninsular India fall under this category (Kumar et al. 2006; Kumar et al. 2008). The agricultural water demands are very high in these regions, with large irrigated areas and high evapo-transpiration (Kumar et al. 2008). Since management of agricultural water demand is extremely important for mitigating water scarcity in these regions, investments should be on land-leveling for on-farm water management, de-silting & lining of canals, and renovation of traditional water bodies comprising silt scrapping, waste weir construction, and embankment stabilization. It is also clear that such activities should be undertaken with utmost care for getting the desired results. Canal lining should be of high quality for its proper functioning to reduce seepage, and therefore should be done under technical supervision of engineers. Land leveling is crucial for large holdings for reducing field runoff and percolation losses (of applied water), and enhancing distribution uniformity.

6. POLICY IMPLICATIONS

NREGS, one of the largest social protection initiatives in the world, promised a lot on water management front but a quick analysis of the types of interventions and limited field evidences suggest that the planning and implementation of WM works are seriously flawed due to the total absence of hydrological and economic analysis. The types of interventions chosen for execution in different zones are not based on considerations of agro-climate, hydrological regime and geological settings, which are of paramount important in deciding the effectiveness of land and water based interventions. We have identified three broad and distinct typologies, characterized by a combination of agro climatic, hydrological and geological settings, to determine the nature of water management interventions for any region in India. We have subsequently discussed the broader water management strategies suitable for each one of the typologies. That said within each typology, a lot of scientific inputs would be required for technical planning of the water management works for any given locality. Some of this may have to come from detailed investigations of catchment hydrology, geo-hydrology, topography and slope characteristics.

The perception that creating more storage space for runoff water in villages through digging tanks and ponds would help water conservation and management is dangerous, and can have several negative welfare effects because of the adverse social and ecological consequences they create in the downstream areas. This can be in the form of drying up of drinking water tanks/ponds in villages (Bachelor et al. 2002); reduced flows into large reservoirs meant for irrigation and drinking (Kumar et al. 2006; Kumar et al. 2008); excessive siltation of traditional water bodies. A number of water management works under NREGS are similar to the activities under other rural developmental programmes such as the National Watershed Development programme. Thus, there is need for convergence for optimal utilization of resources. Careful planning and efficient implementation of WM works can make NREGS a highly effective social protection initiative capable of reducing rural poverty and enhancing livelihoods. But, it is imperative that when public funds to the run of many billion of rupees are spent on creating assets in a decentralized manner in villages, a small fraction of it is spent for planning them, with proper scientific and technical inputs.

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