

Adapting to climate change: Opportunities under MGNREGA

Bhaskar Sinha¹, Anoma Basu² and Anuj Singh Katiyar³

ABSTRACT

The impact of climate change would be the most severe for the poor communities, living in the developing nations with limited options for livelihood and high level of dependence on the natural resources. The impacts would increase the food insecurity, water stress and extreme weather events which would affect the livelihood security of these communities and increase their vulnerability. It is therefore important that development programmes targeting such communities should be underpinned with the measures of adaptation to climate change. Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA), implemented on a national scale is one such programme that creates employment by undertaking diverse activities aimed towards water harvesting, drought proofing, flood protection and plantations.

The study evaluates the ecological and economic impact of MGNREGA in Panna, a drought-prone district of M.P. Threat in relation to climate change, would be more severe as the district is characterized by high level of poverty (72% of population under BPL) and less irrigated land (11.8%). Construction of wells, renovation/construction of ponds, plantations and watershed management are some of the major activities being implemented. These activities are measures towards adaptation to climate change apart from having direct outputs in terms of enhanced agricultural productivity due to increased availability of water and land conservation. Results show an increase in irrigated land by 26% and subsequent increase in their average household income by 15%. In case of Kapil Dhara (construction of well on individual land), there is 100% increase of irrigated land and 45% increase in their income.

With respect to people's perceptions, more than 50% of the respondents ranked prevention of soil erosion and increased soil moisture as the most important benefits accrued due to plantation, but only after they were briefed about different benefits including wage employment, material and ecological benefits. This indicates that sensitization of the masses towards role of MGNREGA in climate change adaptation would add to people's appreciation and participation in the program for championing development with adaptation.

Keywords: MGNREGA, Climate change, Rural development, Adaptation, Agricultural production

¹ Assistant Professor, Ecosystem and Environment Management, Indian Institute of Forest Management, P. O. Box-357, Nehru Nagar, Bhopal-462003. Email: bhaskarsinha@hotmail.com, bsinha@iifm.ac.in Tel: 0755-2775716 (Extn-462), Fax-0755-2772878

² Senior Research Fellow, Indian Institute of Forest Management, P. O. Box-357, Nehru Nagar, Bhopal-462003

³ Project Manager, Indian Institute of Forest Management, P. O. Box-357, Nehru Nagar, Bhopal-462003

INTRODUCTION

Climate change is one of the most severe global problems, impacting the humankind. Intergovernmental Panel on Climate Change (IPCC) has reported that climate change is affecting both the quality and quantum of our natural resources (water, forest, land) and thereby, affecting human well being. The impact of such changes would be significantly higher in developing countries like India, where most of population live in rural areas (NSSO, 2006), as compared to developed countries owing to the their geographical and climatic conditions, the high dependence of the poor people of these nations on natural resources and lesser capacity to adapt to the impacts of climate change (Morton, 2007; Stern, 2007). UNFCCC estimates that as least US \$83 billion per year will be needed by 2030 of protect the livelihoods of poor rural people in developing countries (IFAD).

There have been several programmes/policies initiated by Government of India to address the livelihood opportunities by enhancing the natural capital. Land degradation and water scarcity are the two major bottlenecks in achieving rural development. Further, with the advent of climate change these constraints will pose more serious challenges for different agencies and institutions involved in rural development. It is therefore important that development programmes/scheme should be underpinned with the measures of adaptation to climate change. Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA), implemented on a national scale is one such programme that creates employment by creating productive durable assets at the village level. These assets include construction and renovation of traditional water bodies, provision of irrigation facilities to the poor, plantation, road connectivity and land development. These assets are meant to rejuvenate the rural natural resource bases which in turn give tangible and intangible benefits to the people in sustainable manner. In this background the current study is conceived with the following objectives.

1. To assess the role of MGNREGA activities in addressing various projected impacts of climate change,
2. To valuate the impact of MGNREGA's intervention on agriculture production, and
3. To rank the community's perceptions towards the benefits/services from construction of roads and plantation activities

STUDY SITE

The study was undertaken in Panna district which lies in Bundelkhand region of Madhya Pradesh. The district extends from 23°45' N to 25°10' N and from 79°45' E to 80°40' E having a total geographic area of 7033 ha. The district is rich in forest resources, having 37% of its area as forest and 35 % as cultivable land. Majority of the population (72%) of the district belong to below poverty line (BPL) families.

Being a part of Bundelkhand region, the district has been experiencing severe drought for the last 4-5 years. This has adversely affected the agriculture productivity leading to the food insecurity of the people. Most of the agricultural lands are rain-fed in the region, therefore, less water demanding crops are generally cultivated by the farmers. These

crops included: gram, barley, pea, lentil, linseed, mustard etc. In some part of the district, wheat is also being cultivated by the few farmers who have access to irrigation facilities. Further, agricultural and livelihood pattern of the people may get further affected due to impacts of climate change causing poor and disadvantaged people to become more vulnerable.

National Rural Employment Guarantee Scheme (NREGS) was implemented in year 2007-08 during the second phase of its implementation in the district. Since then, various types of works have been undertaken by the different implementing agencies to address the issues of extreme poverty and ecological sustainability. These agencies include Gram Panchayat (GP), Forest Department (FD), Panna Tiger Reserve (PTR), Rural Engineering Services (RES) and Public Works Department (PWD).

METHODOLOGY

The benefits derived from MGNREGA activities are direct as well as indirect. Direct benefits include enhanced agricultural production and irrigation facilities, improved socio-economic condition, economic security and rural infrastructure. Whereas, indirect benefits include contribution towards environmental sustainability, climate change adaptation, increase in empowerment. Impact on agricultural production due to MGNREGA activities and thereby, increase in the household income was assessed as one of the direct benefits, whereas people's perception towards benefits/services derived from construction of roads and plantation activities were assessed as indirect benefits.

Data collection methods comprised of household survey by open & close-ended questionnaire, Participatory Rural Appraisal (PRA), Focused Group Discussion (FGD) and personal interviews with government officers. Secondary data pertaining to type of activities, location of their implementation, allocation of funds was collected at district/block/ Gram Panchayat from the concerned offices. On the basis of this secondary data, two blocks and two GPs in each of the blocks, representing highest and lowest fund allocation as well as involvement of various implementing agencies were chosen for in-depth study. Stratified random sampling was adopted in picking up the respondents such that the sampled population represented younger and older age groups, rich and poor groups, male and female respondents and beneficiaries of all kind.

In the survey, people's perception of important benefits/services deriving from the construction of roads/plantation activities under MGNREGA was assessed. In order to determine the relative importance of various services getting from such activities, people were asked to assign a rank varying from one to five in decreasing order of importance of the various services which were already listed out in the questionnaire, one representing the most important and five signifying the least important. In case of plantation activities, the non material benefits especially the ones which qualify as climate change adaptation and mitigation measures were also taken into account in order to have a measure of the level of awareness/sensitivity existing among the respondents. Prior to this, they were explained all the benefits or services and how it

effects them in terms of material gains as well as from an environmental point of view. The services which can qualify as climate change adaptation and mitigation measures were also explained to them and their implication in the future also briefed. It was noted that some of these were already known to them, some were known but not recognized, and yet others which were brought into the perception of the respondents only due to the discussion.

RESULTS & DISCUSSION

MGNREGA and Climate Change Adaptation

Majority of the activities under MGNREGA implemented in the district could qualify as adaptation measures to climate change. Activities such as digging of wells, farm ponds, construction of farm bunds, community wells, community ponds, renovation of old water bodies, plantation, watershed treatment can be considered as measures to climate change adaptation. These activities are further grouped to show their specific contributions in addressing different likely challenges emerging due to climate change (Table 1).

Bulk of the activities under MGNREGA observed in the district is aimed towards harvesting and conserving surface and ground water. This trend is similar to the trend reported by MoRD at the national level. 49 % of the total MGNREGA's activities are related to conservation and harvesting of water in the country for the financial year 2007-08 (MoRD, 2009). It is well known that water storage and its management is one of the major measures for adapting to climate change. In this regard, International Water Management Institute (IWMI) reported that "in adapting to climate change, careful attention must be given to the full continuum of physical water storage from groundwater, through soil moisture, small tanks and ponds to small and large reservoirs".

Table 1. MGNREGA Activities with their Contribution in Adapting for Different Projected Impacts of Climate Change

Issues Activities	Food security	Water scarcity	Ecological sustainability	Health hazard	Extreme weather events
Well and pond	Increase in total crop area, crop diversity and crop yield	Enhanced provision of water for Irrigation, livestock, domestic purposes, surface water storage and ground water recharge	Efficient water use	Safe water	Drought proofing
Plantation on individual, community and degraded forest land	Edible produce	Ground water recharge, reduced evaporation from soil, surface runoff	Soil and biodiversity conservation, and increase in green cover and carbon sequestration	Improved micro-climate	Drought proofing, flood protection
Watershed management	Enhanced agriculture due to better soil and water management	Better soil moisture regime, surface water storage, Reduced surface runoff	Improving the resilience of ecosystem		Drought proofing, flood protection
Well for potable water		Potable water availability		Sanitation, safe water, prevention of water-borne diseases and contamination.	Drought proofing.
Road construction	Faster supply and distribution of food grains during emergencies			Sanitation, increased facilities in health emergency	Coping for risk and disaster mgt.,

It may be noted that although the above categorization has been done, the issues addressed by MGNREGA activities pertaining to climate change adaptation and mitigation are largely overlapping, in such sense that each activity addresses a number of issues and also multiple activities may address one particular issue. However it is important that most activities, address these issues in one or more ways. Although at the policy level, MGNREGA is recognized as one of the measures of dealing with climate change (as per India's 24 initiatives to climate change adaptation) at the national (MoEF, 2010) and international levels (UNEP, 2010), the level of awareness among the implementing agencies is abysmally low. The current study further revealed that the beneficiaries recognize the importance of different ecosystem services due to MGNREGA activities. However, they were not able to view these activities from the point of adaptation and mitigation measures of climate change. It is quite evident that MGNREGA activities do address the issues of climate change, but a wider awareness among the implementing force is expected to make this more effective. This may be achieved by providing trainings and capacity building programmes designed especially for the implementing agencies.

Impact on Food Security

Since the inception of MGNREGA, increased water availability has brought major change in the livelihood opportunities of the rural people due to various activities under MGNREGA. The results reveal that irrigated land area has increased from 53% to 79% of the total land owing to increased water availability among all the respondents (Figure 1). In case of kapil dhara (KD) beneficiaries⁴, 100% of quantitative shift from un-irrigated land to irrigated land has been observed. Given the fact that KD beneficiaries have comparatively smaller average land holding size (1.4 ha) as compared to big farmers (having 5.5 ha of average land holdings), irrigation wells have provided considerable benefits in terms of increased crop intensity and agricultural production to the KD beneficiaries.

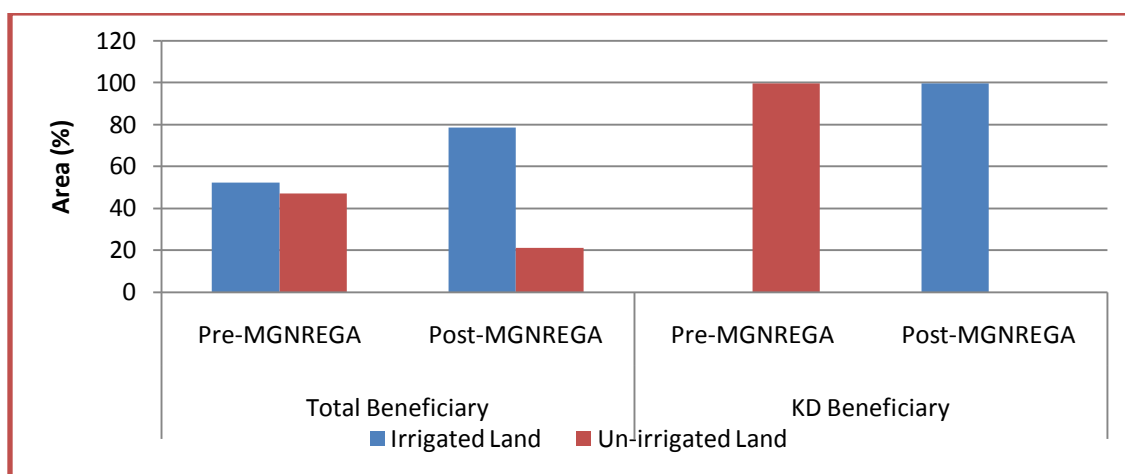


Figure 1: Impact of MGNREGA on irrigation in Panna district

⁴ KD beneficiaries are those farmers who has got irrigation well constructed on their individual land under MGNREGA

Improved water regime has led to increase in agriculture production. The primary results reveal that people have started cultivating wheat (which require more water) to meet their consumption demand. The production of wheat has almost doubled (increased from 9.68 qt/hh to 19.55 qt/hh) for all the respondents, whereas, in case of KD beneficiaries, it has increased by five times, i.e., from 3.29 qt/hh to 17.36 qt/hh (Table 2). The significantly higher wheat production observed for KD beneficiaries is due to complete replacement of gram by wheat on the account of access to irrigation for their entire land. Of these farmers, some have reported of growing wheat for the first time on their agriculture land. This also corroborate the trend observed in the district agriculture production data that shows the incremental impact on agriculture commodities due to MGNREGA's activities (District Collectorate's report on drought). It can be summed up in the way that people are stepping towards domestic food security.

Increased crop intensity and agricultural production has created significant impact on household income to the rural communities. In the sample areas, primary data shows that the household income of total respondents has increased by Rs. 4067/hh (15%) owing to increased water availability. In case of KD beneficiaries, this figure is even higher (Rs. 7057/hh or 45%).

Table 2: Increased agriculture production and household income (in Rs.) of total and KD-beneficiaries due to MGNREGA's activities in Panna district

Activity	Total Beneficiaries			KD-beneficiaries		
	Wheat (qt/hh)	Gram (qt/hh)	Total income (Rs/hh)	Wheat (qt/hh)	Gram (qt/hh)	Total income (Rs/hh)
Pre MGNREGA	9.68	6.56	27023	3.29	5.11	15507
Post MGNREGA	19.55	2.58	31090	17.36	0.00	22564
Net Income			4067 (15%)			7057 (45%)

Earlier, farmers had to buy wheat from the market in exchange of gram. Now, they are becoming self-sufficient in terms of food availability and fulfilling the consumption demand of households. In addition to this, MGNREGA's activities have provided opportunities to undertake other diverse income generating activities because of availability of water based on their traditional skills. As for an example, in one of the sampled villages, some of the KD beneficiaries have taken up brick making in the village and are selling it to neighbor villages. This implies that MGNREGA activities are contributing to diversity of livelihoods options for the farmers to become self-sufficient.

MGNREGA has consistently been instrumental in rejuvenation of natural resources, especially soil and water. This acts as an adaptation measure of climate change, which is going to hit hardest and earliest to these vulnerable groups (i.e. small and marginal farmers). In addition, it contributes in achieving food and economic securities of the vulnerable communities.

Measuring People's Perception

Benefits from Construction of Roads

The people were asked to rank the benefits from the construction of roads in the order of their importance as they perceive, the most important benefit being ranked as one and the least benefit being ranked as 5. The benefits that were listed out were: wage employment, approach to main market, increase in the frequency of the visits of government officers, facilities in case of health related emergencies, transportation facilities, effect on education and sanitation.

Table 3 expresses the percentage of the total respondents who assigned a particular rank to any given benefit. Values are assigned to these ranks in order of importance, i. e., most important would have the highest value (5), and the other ranks in continuous descending order. These values in-turn are multiplied with the percentage value of people assigning each rank to each service to derive a single value for each service and each rank. The resultant value gives us the cumulative importance of that service as perceived by the respondents. These values are listed in the last column of the table 3 (with one decimal place shift for convenience as they were too large).

Table 3: Perceived benefits of the rural communities in Panna district from road construction

Services	Percentage of respondents assigning rank					Cumulative value
	MI	VI	I	SI	LI	
Approach to main market	81	14	6	-	-	47.9
Frequency of government officers visit	64	25	6	6	-	45
Health facilities in case of emergency	8	11	3	36	42	20.7
Transportation	67	31	3	-	-	46.8
Effect on education	25	31	25	14	6	35.8
Sanitation	44	31	19	6	-	41.3

From the above representation it is evident that most of the respondents (81%) rank approachability to main market as the most important benefit due to the new roads constructed. 67% of the respondents thought that improvement in transport facilities is the most important benefit. It is an important observation that 64% of the respondents ranked the increased frequency of visits by government representative as the most important service due to road construction. This implies that the people appreciate the importance of being mainstreamed due to the developmental activities and recognized the increased communication leading to better governance and transparency, which are also some of the outcomes which MGNREGA aims to achieve. It can be also noted that awareness regarding the effect of these roads in improvement in education facilities (accessibility to schools, colleges in terms of time and effort of travel) is also quite

considerable with 25% and 31% of the respondents perceiving this benefit as most important and very important, respectively. The other benefits which were considerably recognized by the people were the improvement in sanitation of the village (most important – 44%, very important- 31%); improved facilities in case of health related emergencies (42 % people thought important although only 8% people thought it was most important). When these services are ranked in order of cumulative importance as perceived by all respondents depending on the above calculated value, then the results show that the people perceive approach to the main market as the most important service (47.9), followed closely by transportation facilities (46.8), then by frequency of visits by government officers (45), sanitation (41.3), effect on education (35.8) and facilities in case of health related emergencies (20.7) in the descending order of importance

Plantation

Similar to the benefits from road construction, the ranking of the services from plantation activities as perceived by the people of Panna is also calculated (Table 4).

Table 4: Perception ranking of benefits of the rural communities in Panna district from plantation activities

Services	Percentage of respondents assigning ranks					Cumulative value
	MI	VI	I	SI	LI	
Wage employment	67	33	-	-	-	46.7
Material benefits	53	36	11	-	-	44.2
Prevention of soil erosion	58	33	8	-	-	44.6
Reduced runoff	42	33	19	3	3	40.8
Increased soil moisture	53	22	17	8	-	42
Aesthetic values	11	42	31	11	6	34.4
Cultural and social benefits	19	36	25	19	-	35.2
Altering micro-climate	19	33	28	14	6	36.5

Majority of respondents rank the wage employment provided by the plantation activities as its primary benefit (67% - most important; 33% - very important). Although the above response of people regarding the employment generation due to plantations was predictable, the observation as shown above also reveals the increased amount of appreciation among people for the services of plantation relevant as climate change adaptation and mitigation measures, once they were briefed beforehand. The people who recognised the benefit of soil conservation by plantations as most important (58%) were greater than those who ranked material benefits as most important (53%). In the same context it is observed that considerable percentage of the respondents assigned most importance to the services like increase of soil moisture (53%) and reduced runoff (42%). Services are ranked in order of cumulative importance as perceived by all respondents (as calculated for road construction), then the results showed that the people perceived wage employment as the most important service (46.7), followed by the services of prevention of soil erosion (44.6), provision of material benefits (44.2),

increase in soil moisture (42), reduced runoff (40.8), altering microclimate (36.5), Cultural and social benefits (35.2) and aesthetic value (34.4) in decreasing order of importance. This further implies that the rural communities have intrinsic recognition towards the ecological benefits of the plantations apart from its direct benefits.

WAY FORWARD

MGNREGA is directly contributing to economic security and social up-liftment through its diverse activities and high level of people's participation. Simultaneously, it also contributes to ecological security and measures for adapting to climate change. Training and awareness programs for the sensitization of the staff at the level of implementation have to be taken up in order to effect increased appreciation of the importance of MGNREGA activities from the point of view of climate change. Such increased level of awareness would also lead to proper planning with greater responsibility and hence the issue of climate change may be more effectively addressed through MGNREGA.

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