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A Geographical Analysis of Indirect Impact of Mahatma Gandhi National Rural Employment Guarantee Scheme (2005) on Freshwater Fish Cultivation in India

Abstract

Empirical verification of productivity of the expenditure under the policy of Mahatma Gandhi National Rural Employment Guarantee Scheme, 2005, on freshwater fish cultivation at the national as well as the state level in India is undertaken in the present study in order to assess the relevance of the utilization of public fund in the said scheme when the major part of the annual budget of the scheme has been utilized on water conservation, renovation of traditional water bodies including desilting of tanks, excavation of additional ponds etc. Though the initial objective of the said scheme was not concentrated on the fish productivity or volume of production, however, in terms of enhanced quantity of freshwater fish stock or upward shifting in production in presence of MGNREG scheme is being quantified empirically. Our quantitative analysis of time series data on 30 years' dummy variables reveal that more than fifty percent of 18 major states and India as a whole are capable of producing relatively large quantity of freshwater fish as a consequence of policy-based change like introduction of referred public wage scheme. In contrast, fish-output in some states does not respond positively in the scheme, which can perhaps be explained by the exclusion of water conservation programme under MGREG scheme. The study, thus, tried to examine whether there is any sort of causal relation between the MGNREG expenditure and quantity of fish production in a pooled data system. If so, what are the relative magnitudes of such causal relation? The study observes that there are bilateral causalities between the two and there are significant influences of one upon another.

Key Words: *MNREG, Fish Production, Time Dummy, Granger Causality etc.*

Introduction:

Implementation of any public policy at the cost of peoples' money in public interest is quite difficult achieving its target unless we have sound infrastructure for its execution, because unbearable social cost compared to social benefit matters much in a developing nation in particular. So many government policies have been adopted in India since independence without assessing the quality of man-power based infrastructure, especially to plug the leakage of public fund as middlemen, unethical public representatives and power brokers are proactive in gobbling in their lion's share of the project fund. In the similar way National Rural Employment Guarantee Scheme, 2005 (renamed as Mahatma Gandhi National Rural Employment Guarantee Scheme), has come into force without setting up the desired infrastructure at the Panchayet levels. In spite of bottlenecks, resurgence of Mahatma Gandhi National Rural Employment Guarantee Scheme in the form of Act (MGNREGS) in India in 2005 is an outstanding time-relevant policy conforming to one the properties of (R.M Sollow) sustainable growth (as it is supplementary to the enhancement consumption-investment ratio or removal of poverty) and it was obviously underlined as a big push on the part of the central government to create durable rural assets and large scale guaranteed employment to the unskilled poor people. The policy is, no doubt, supposed to be supplementary to the theory of inclusive growth when ongoing rampant poverty sounds bad even in the new millennium in India. Rural productive assets or infrastructures generation and creation of rural guaranteed employment matter much in the face of increasing tendency of inequality of income distribution in India because it would at least support the idea of inclusive growth theoretically to speak of. It is undeniable that implementation of any policy in public interest in particular depends on stringent and watertight national administrative network when performance, dutifulness and ethics of the civil servants,

public representatives often undermine the potentiality of the government aided projects. The additional infrastructure for cultivation of freshwater fish with the help of rainwater harvesting is one of the indirect outcomes of MGNREG scheme. The supply side of generation of output of freshwater fish is important enough compared to the demand comprising creation of large-scale employment in rural India so far as generation of real well being is concerned. Though, we cannot deny that the social benefits of additional irrigation facilities of the renovated water bodies as a component part of the supply side, which indirectly affects agricultural productivity positively since scarcity of freshwater even in the agricultural belt is pronounced. Priority to generate employment to the poor people is important, but it is more important to construct rural assets or infrastructure or to produce renewable resources like fish for the sustainable growth, despite the unchecked poverty in rural belt today. Accordingly, MGNREG scheme is a splendid venture to hit the hammer when the iron is hot for reducing the volume of poverty, if it sustains productively.

Water conservation, renovation of traditional water bodies including desilting of tanks, excavation of new ponds are included in MGNREG scheme that indirectly effects freshwater fish productivity, hence the stock of fish at the Panchayet level throughout the country is likely to get a U turn, if the policy is effective at all. We cannot deny that the indirect impact of expenditure in the yearly budget of MGNREG at the state level on freshwater fish productivity is expected to be positive, as conservation of water bodies and rainwater harvesting are the prime objectives of the said scheme. There is a scope for empirical verification for justifying our hypothesis of impact of annual expenditure under MGNREG scheme on production of freshwater fish. Since 2005, as it comes into force in 2006-07 effectively, it is not sufficient time span for empirical testing of the proposed hypothesis of the study, but we could take a quick look

empirically at the productivity of the expenditure under MGNREG scheme on freshwater fish cultivation at the state level.

Literature Review:

According to Mehrotra (2008), the eleventh plan and annual plans for 2007-08, 2008-09 have already enhanced the allocation for centrally sponsored watershed development programmes. Desert Development Programme, Drought-Prone Area and Integrated Watershed Development Programme could be run along with MGNREG's water conservation. As per Kheri (2008) the act can be an opportunity to promote overall rural development and alter the balance of power in village society. The report of the Ministry of Rural development (2006-07) of India reveals that about 54 percent of total fund allotted to MGNREGS was spent or utilized on water conservation and water harvesting including renovation of traditional water bodies in 2006-07**.** The same report mentioned that 737 lakh cubic meter of water storage capacity was generated through digging new tanks, ponds, percolation tanks and check dams. Besides this, 481 lakh cubic meter of water storage capacity through desilting of traditional tanks/ponds, old canals was created by the same scheme. One survey was conducted by NSS (66^{th} Round) between July 2009 and June 2010 in all states. This appears to reflect the scheme's built-in "self-targeting" mechanism, whereby non-poor people find work on the scheme less attractive than do poor people. This should not be interpreted as indicating that well-off families in rural India are turning to MGNREGS (Dutta et al 2012).

Objectives:

Empirical verification of productivity of the expenditure under MGNREG Scheme, 2005, on freshwater fish cultivation at the national as well as the state level in India is undertaken in the present study in order to assess the relevance of the fund utilization in the said scheme when the major part of annual budget of the scheme has been utilized on water conservation, renovation of traditional water bodies, including desilting of tanks, excavation of ponds etc. Indirect benefits in terms of enhanced quantity of freshwater fish stock or the higher prospect of production under the MGNREG scheme can be quantified empirically, which might register a downward trend because of the relative scarcity of inland water reserve in the absence of MGNREG Scheme prior to 2005.

Materials and Methods:

Difficulty in collecting reliable secondary time series data matters much in the face of almost non-accessibility to the primary data in the present study. We have collected long range time series data on quantity of freshwater fish production for each major state from the Department of Animal Husbandry, Dairying and Fisheries, Ministry of Agriculture, Government of India. State-wise time series data covering the period 2006-2011 on annual expenditure on MGNREG, 2005, scheme is secondary in nature, and it is collected form MGNREG Division, Ministry of Rural Development, Government of India. Indian data bank is so poor that it confirms non-availability of separate data on fund utilization for water conservation under MGNREG scheme in the custody of Ministry of Rural development .Data on annual stock of natural water is important in the present study so far as hydrological cycle is concerned , but being a citizen of India I have been denied access to having data from the concerned department of the Government of India,

because of the restriction imposed on the Right to Information Act, 2005 due to national security. The official data supplied by the concerned department of the Government of India are assumed to be reliable and there is no other alternative except using the same data in the present study. The study could have been more exhaustive and useful for policy making if the relevant data on freshwater stocks were available.

The relationship between the economic variables is to be assessed empirically by regression analysis based on available time series data of cardinal variables like annual production of fish and expenditure on MGNREG scheme since most of the fund of the scheme have been utilized for rain water harvesting. The behavioural relationship might shift or oscillate between one period and another because of the introduction of the government policy via execution of MGNREGS with effect from 2005-06 in India. The qualitative variable may play a crucial role in determining economic behaviour, hence time-dummy variables are incorporated in the estimation process. Granger (1969) causality test has been run to examine whether there is any sort of causal relation from MGNREG Expenditure to Fish Production or the reverse. Since number of observations is relatively small, pooled data on annual freshwater fish production vis-a-vis annual MGNREG expenditure covering 18 major states are taken under consideration for having better result of causality tests and the estimation of the parameters of the linear regression equations to quantify the impact of MGNREG expenditure on fish production and the reverse, if at all exists.

Sources of Inland Water with MGNREG Flavour:

The National Rural Employment Guarantee Act of 2005 created a justifiable “right to work” for all households in rural India through the National Rural Employment Guarantee Scheme,

renamed the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) enacted in 2009. This promises of 100 days of work per year to all rural households whose adults are willing to do unskilled manual labour at the statutory minimum wage notified for the programme. Work is to be made available to anyone who demands it within 15 days of receiving an application to work, failing which the state government is liable to pay an unemployment allowance. This kind of uncertainty about disbursements in risky environments would be a challenge to any government at any stage of economic growth and development. Even if flexibility in spending is not an issue, accommodating supply to demand could still be a challenge, particularly in poor areas. According to the administrative data, 52.865 million households in India demanded work in 2009-10, and 99.4% (52.53 million) were provided work. Further, state and local governments have an incentive not to report unmet demand, given that this implies they should pay unemployment allowances. Moreover, the capacity for preservation or restoration of natural freshwater in our country is, no doubt, enhanced because of the introduction of MGNREG scheme since 2005. Although water levels or the available quantity of water in the respective water sinks at the state level depends on hydrological cycle even in the phase of global warming and climate change, intensity of rainfall in particular. The rates of evaporation, percolation or ground water recharging, precipitation, rain water etc, influence the availability of water stocks in different water bodies. Inland water resources are classified as rivers and canals, reservoirs, lake and ponds, beels, oxbow lakes, derelict water and brackish water that are all treated as basic input for fish cultivation. We might take a note, except rivers and canals, total water body covers about 7 million hectors of land as per report of the Central Water Commission, Government of India. Undivided Uttar Pradesh occupies first place with total length of rivers and canals as 31.2 thousand kilometers; which is about 15 percent of total

length of rivers and canals in the country. Among the remaining forms of inland water, tanks and pond have occupied 2.9 million hectors land, followed by reservoirs 2.1 million hectors despite the possibility of variability of water bodies over the years. Most of the area under tanks and ponds lies in southern states of Andhra Pradesh, Karnataka and Tamil Nadu. These states along with West Bengal, Rajasthan and Uttar Pradesh account for 62 percent of total coverage under tanks and ponds in the country. As far as reservoirs are concerned, major states like Andhra Pradesh, Gujarat, Karnataka, Madhya Pradesh, Maharashtra, Orissa, Rajasthan and Uttar Pradesh account for larger portion of total coverage. More than 77 percent of area under oxbows, lakes, derelict water lies in the states of Orissa, Assam. Orissa ranks first as regards the total area under brackish water and is followed by Gujarat, Kerala and West Bengal. It is evident that total water resource is unevenly distributed over the country as geographical factors are prime determinant to the natural water endowments for the purpose of fishing.

Most of the states have resorted to their own ways and means of spending fund allocated in MGNREG since 2005-06, especially conservation of water and road connectivity works. As per report (June 2011) of the Director, National Rainfed Area Authority under the Planning Commission, during 2008-09 about Rs.27250 crore were spent under MGNREG on its various components. Out of this about 60% was spent on water conservation and water harvesting components. It is evident that only five states have utilized substantial amount of allotted fund under MGNREG to the water conservation works during 2006-07, and water works in Andhra Pradesh alone accounted for about 67 percent of total allotted fund in the said scheme**.** Uttar Pradesh, Orissa, Assam and Bihar have given priority to the works of road connectivity and water conservation in the same period. Blue work of rural development like water conservation

even in the water-intensive states is proved to be the mainstay under the umbrella of MGNREG scheme. According to Union Rural Development Ministry, millions of people in the country frantically seeking jobs under the programme embarked on building or reviving 3.4 million water conservation structures during the last five years when construction of water conservation structures is compulsory under the scheme. In the last five years, central government has spent about Rs.110 000 crore in this scheme (Mahapatra et al 2011) and spending on water conservation structures was close to Rs.54000 crore, and hence these water sinks should have created a huge rainwater harvesting capacity for fish cultivation to speak of. The programme claims the added capacity on 3.07 cubic million meters under water conservation and renovation of traditional water bodies. Several studies are done on a small scale too. The commissioner of Rajasthan MGNREG claims additional 20 billion liters of water have been created during August 2005 to July 2011. Dungapur, one of the districts of Rajasthan, spent about Rs.482 crore and 31616 water structures have been constructed during the period 2006 to 2011. Official reports reveal enough water harvesting capacity have been generated for agricultural purposes, as fishing is a part of agriculture. One survey report establishes that of let percentage of water conservation works under MGNREG scheme is declining steadily at the national level. In 2006-07, completed water conservation works accounted for 48 percent of proposed works and it has been decreased to 38 percent in 2011-12. It is undeniable that some of the districts declared as drought-affected because of deficient rain even in the rainy season. As a result, available quantity of fresh water has got down-trend despite additional water structures constructed or revived with MGNREG fund. The state like Uttar Pradesh spent, on an average, Rs.5 lakh on each 45000 ponds for the purpose of rainwater harvesting during MGNREG era, while 30 percent of them are dried up because design and planning of works did not consider local ecosystem or ambient geographical

factors. Pani (2011) suggested that technical inputs deployed on the works of MGNREG are very weak or not scientific**.** The workforces of Panchayets are not trained whereas they are the ultimate authorities for executing the voluminous works when skills, design of works, planning etc are very important. The perspective plans are mostly prepared at the district level and hence non-synchronization between what is planned and what the rural people need is barely exposed. The leakage of fund, gobbled up by the middlemen, power brokers and local politicians and official by means of unethical ways, have badly shaken the effectiveness of the said scheme. The pampering of the corrupt persons in the face of increasing trend of international corruption perception index in India is very much proactive because the check valves legislative and judiciary systems do not work to prevent maximum level of law and orders to a minimum for reducing the corruption indexes.

Result and Discussion:

Data on annual fish production at the national level during the period 1980-81 to 2009-10 are represented by line diagram (Fig -1) which shows that it increases at a increasing rate and hence slope of the curve after 2006-07 in particular becomes steeper up to a certain extent. Accordingly, it may be suggested that the positive impact on fish cultivation after 2006-07 is pronounced due to introduction of MGNREG scheme which is also justified by the regression analysis with time-dummy variable.

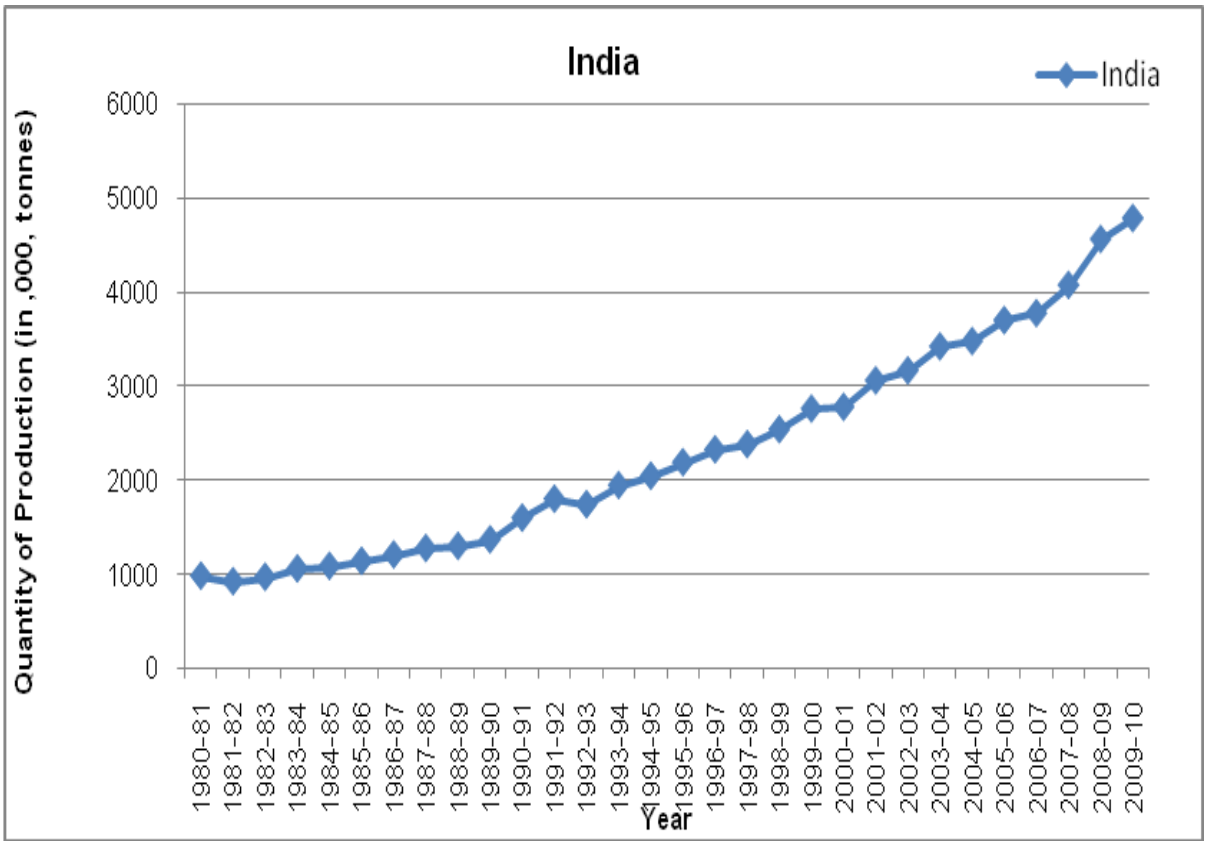
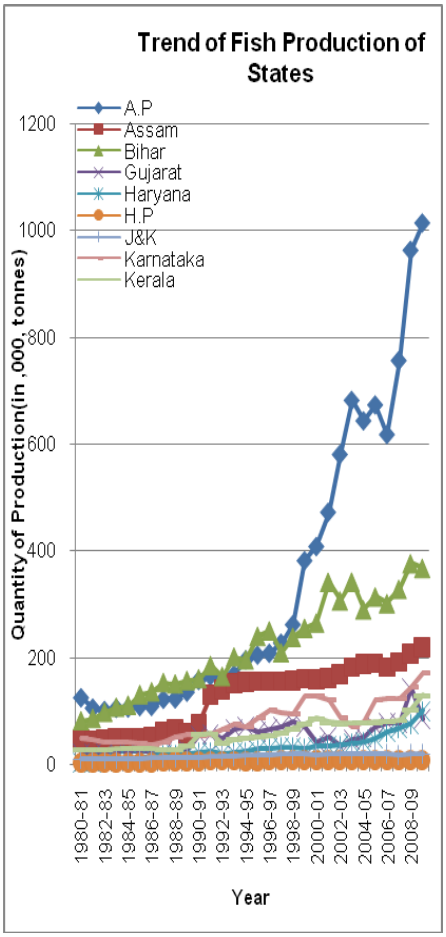


Figure -1

Separate trend for each of 18 major states are depicted by the line diagrams (Fig-2 & Fig-3) for quick realization. West Bengal and Andhra Pradesh are supposed to be leading contributors to the benefit of the scheme.



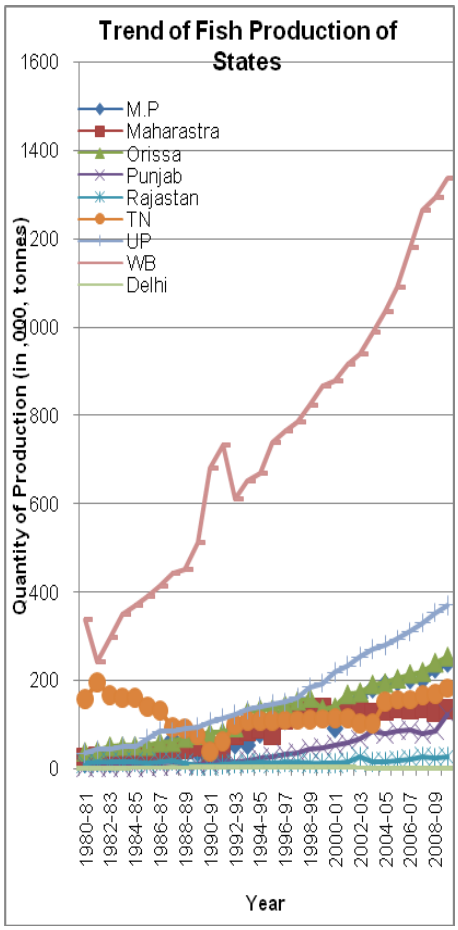


Figure -2

Figure -3

Econometric analysis:

In this section we first attempt to examine whether there are any sort of shift in upward direction of the production of fish at state levels from the year of MGNREG to take action. It is partially evident from the figures of fish production of the states that there are rise in productions of fish in some of the states from the year of inception of MGNREG programme. To have a clear picture about the influence of MGNREG upon quantity of fish production we have set time dummy for the states corresponding to the year of MGNREG. The results are shown in Table-1.

Table-1: Regression of Quantity of Fish Production on time with time dummy with effect from 2006-07 (1992-93 to 2009-10)

Indian States	Intercept	Time coefficient	Time Dummy coefficient	R Square
Gujarat	19.38 (2.77)	1.86 (4.12)	22.71 (4.13)	0.63
Haryana	2.11 (0.92)	1.59 (10.69)	28.55 (7.54)	0.94
Orissa	17.72 (3.73)	6.84 (22.30)	18.59 (2.38)	0.97
Rajasthan	11.96 (8.25)	0.13 (1.34)	9.03 (3.78)	0.56
Tamil Nadu	134.97 (10.21)	-1.27 (-1.45)	69.16 (3.17)	0.28
Uttar Pradesh	2.01 (0.32)	10.17 (24.91)	48.12 (4.63)	0.98
Maharashtra	4.74 (0.94)	5.37 (16.43)	-25.40 (-3.05)	0.93
J&K	8.10 (22.23)	0.48 (20.69)	-3.24 (-5.39)	0.95

Assam	22.94 (3.30)	6.82 (15.18)	-18.45 (-1.61)	0.92
Bihar	61.13 (7.46)	10.16 (19.17)	-7.31 (-054)	0.96
AP	- 47.23 (-1.11)	22.58 (8.24)	240.22 (3.44)	0.86
HP	2.29 (8.80)	0.21 (12.95)	-0.94 (-2.20)	0.89
Karnataka	27.11 (3.63)	3.31 (7.42)	18.81 (1.66)	0.80
Kerala	14.23 (3.62)	2.61 (10.29)	9.29 (1.43)	0.88
MP	-14.32 (-1.85)	7.13 (14.28)	29.27 (2.30)	0.93
Punjab	-16.79 (3.91)	3.36 (12.13)	14.43 (2.04)	0.91
West Bengal	216.63 (12.38)	32.32 (28.55)	131.52 (4.56)	0.98
Delhi	2.40 (6.18)	0.33 (1.32)	-2.70 (-4.21)	0.42
All India	469.43 (6.16)	113.78 (23.09)	581.68 (4.63)	0.97

(Values in parentheses denote t- ratios)

It is observed from the table that about 10 states out of 18 shows encouraging results under the policy of Central Government so far as indirect benefit in terms of enhanced quantity of fish cultivation is concerned. Andhra Pradesh is considered as a leader as we get a big shift during the period of implementation of the scheme. West Bengal stood second in position for having the percolated benefit of the scheme despite the falling rate of rainfall even in the rainy season. Tamil Nadu and Uttar Pradesh have drawn benefits immensely since significant coefficients of time-dummy variable make a shift of their quantities of produced output. According to our empirical support, Gujarat, Haryana and Orissa are not excluded from the list of beneficiaries. In contrast, fish-output in some states does not respond at all as the coefficients of time-dummy variable are found to be insignificant. It is true that newly excavated ponds would not be useful for fishing purposes unless sufficient run-off- plugging is realized when profound shortfall of rainfall in the age of global warming is pronounced. Perhaps one of the causes of insignificant relationship for some states is explained by the process of omission of the water conservation programme under MGNREG Scheme. Negative coefficients of time-dummy variable for some states reduce the magnitudes of fish-output that might be justified by uneven or declining trend of rainfall. Besides this, over-all value of the intercept for India is shifted during the phase of the execution of the scheme.

The individual state specific analysis may suffer from the omission of interlinkages among the states. Inclusion of such interlinkages may produce different results in comparison to the individual state specific analysis. One way of incorporating interdependences among the states is to pool the data of all the states and to test whether there is any significant influence of MGNREG expenditures upon the fish production. In another side of coin we can also test whether fish production deserves MGNREG type of expenditures to be introduced in a pulling

mode. Before going to quantify all such impacts we need to test primarily whether there is at all causality between MGNREG expenditures and quantity of fish production.

We have done the causality tests in line with the Granger (1969). The test procedure can be done by estimating the following two equations where variables X and Y stand for the MGNREG Expenditure (in Rs. Lakh) and Fish Production (in thousand tones). The equations are

$$Y_t = \sum_{i=1}^{n} \alpha_i X_{t-i} + \sum_{j=1}^{n} \beta_j Y_{t-j} + u_{1t} \quad \text{.....(1)}$$

$$X_t = \sum_{i=1}^{n} \lambda_i X_{t-i} + \sum_{j=1}^{n} \delta_j Y_{t-j} + u_{2t} \quad \text{.....(2)}$$

where Y_t = time series values of the variable Y at period t

Y_{t-j} = ……lag t-j

X_t = time series values of the variable X at period t

X_{t-i} = …….lag t-i

u_{1t}, u_{2t} = normally distributed error terms that are serially independent

α_i = responsiveness of Y_t w.r.t. X_t for i^{th} country

δ_j = ……..X_t w.r.t Y_t for the i^{th} country

X variable causes Y if $\sum\alpha_i = 0$ is rejected or $\sum\alpha_i \neq 0$ is accepted in equation (1) and $\sum\delta_j = 0$ is rejected by equation (2). On the other hand, Y causes X when the null hypothesis of $\sum\alpha_i = 0$ in equation (1) is accepted and $\sum\delta_j = 0$ in equation (2) is rejected. There will be bidirectional or

feedback causality between X and Y if the null hypothesis of $\sum\alpha_i \neq 0$ is accepted in equation (1) and $\sum\delta_j \neq 0$ is accepted in equation (2).

Table-2: Granger Causality Test Results of Pooled Data of States

Hypotheses	Lags	F Values	Probabilities	Remarks
MNREG do not cause Fish Production	1	12.26	0.0008	Bidirectional Causality
Fish Production do not cause MNREG	1	16.89	0.0001	Bidirectional Causality

It is observed from Table-2 that there are bidirectional causalities between MGNREG expenditures and quantity of fish production at lag 1. This means MGNREG has impacts upon fish production as well as fish production has impacts upon the MGNREG expenditures. Both of the factors are cause and effects to both. The results ensure us to go for quantifying the impact factors by means of linear regression techniques.

We have pooled data covering major 18 Indian states for the period 2006-07 to 2009-10 (N = 72) on annual fish production and annual MGNREG expenditure. The estimated regression equations of quantity of fish production on MGNREG expenditures is given in equation (3) and the reverse regression results are given in equation (4). The figures in the parentheses represent estimated t values with degree of freedom 70.

Fish production = 120.58 + 0.0015 MGNREG Exp ……(3) R Square = 0.74

(t = 1.88) (t = 14.29)

We find well fitted statistically significant linear relationship between quantity of fish cultivation and MGNREG expenditure, revealing the variations of quantity fish cultivation in India over the years after 2006-07 is obviously explained by the variations MGNREG expenditure incurred at the all India level. One unit rise in the MGNREG expenditure leads to rise in fish production by 0.0015 units. In other words, if MGNREG expenditure is raised by one lakh rupees then fish production rises by 0.0015 thousand tones or 1500 kgs. If we take, as proxy, Rs 100 as the price of fish per kg then Rs. one lakh of expenditure leads to Rs. 1.5 lakh amount of fish production which implies a multiplier effect of MGNREG programme upon fish production. The supply side of generating additional output of fish in the face of implementation of subsidized-employment-intensive scheme would perhaps accommodate demand, at least partially, comprising of creation of large scale rural employment.

MGNREG Exp = 756.59 + 504.7 Fish production …….. (4) R Square = 0.74

(t = 0.019) (t = 14.29)

On the other hand there is a demand side effect that fish production pushes the government to launch MGNREG type of asset generating programme in rural belt of the country. Equation (4) suggests that there is a positive and significant impact of fish production upon MGNREG expenditures. One unit rise in fish production deserves 504 units of MGNREG expenditures to be made. The above results infer that MGNREG scheme has been better for the country,

although there has been increasing magnitudes of corruption in this employment generating programme.

Summary and Conclusion:

Our quantitative analysis of time series data on 30 years with dummy variable reveal that more than fifty percent of 18 major states and India as a whole have been capable in producing relatively large quantity of freshwater fish as a consequence of introduction of referred public wage scheme. In contrast, fish-output in some states does not respond positively in presence of the scheme, which is perhaps explained by the exclusion of water conservation programme under MGNREG scheme. There have been bidirectional causalities between quantity of fish production and MGNREG expenditures. Pool data covering annual fish production in 18 major states and state wise annual MGNREG expenditure for the period 2006-07 to 2009-10 support our above desired result; India has got an upward shift in terms of fish output consequent to the implementation of the scheme.

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