

# Scope of policy convergence approach to freshwater management in rural Jharkhand

## A review of public policy

Nafisa Priti Sanga

*Welfare Department, Government of Jharkhand,  
Jharkhand Tribal Development Society, Ranchi, India, and*

Rajeev Kumar Ranjan

*Department of Ministry of Rural Development, Government of India,  
DRDA, East Singhbhum District Collectorate, Jamshedpur, India*

Freshwater  
management  
in rural  
Jharkhand

129

Received 7 September 2014  
Revised 7 December 2014  
Accepted 16 December 2014

### Abstract

**Purpose** – The purpose of this paper is to study Indian aspects of policy convergence in the context of budgetary linkage of two nationalized flagship programs – Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) and Integrated Watershed Management Program (IWMP). Therefore, in lieu of inter-departmental convergences; issues related to water resource development of Jharkhand's (India) rain-fed areas were addressed.

**Design/methodology/approach** – Centered on policy convergence strategy, present study applied comprehensive review and analysis approach for formulation of research base. A conceptual framework was thus designed for analytical purposes and therefore advancing toward conjectural knowledge base.

**Findings** – Application of inter-departmental policy convergence strategy suggested ample opportunities for optimal water resource development. Presence of abundant wage labor, rich indigenous water management techniques, tested replicable models, under-harvested rainwater potential, etc., appeared as catalysts of policy convergence. Yet, State's lack of inter-departmental coordination and grass-root institutional framework will continually challenge policy convergences in absence of good governance.

**Originality/value** – An initiative of Indian government; MGNREGA has received international attention due to its wider coverage including natural resource management, besides guaranteed wage employment. Targeted at freshwater management discourse of Jharkhand; present paper reviewed prospective inter-departmental policy convergence strategy within various arena of MGNREGA, by exploring associated scopes and challenges. Similarly for cost effectiveness, related to maintenance and lift-irrigation demands of rain-fed area development; the present study suggested optimum utilization of inter-departmental funding linkages for development of sustainable water resources.

**Keywords** Freshwater harvest, Policy convergence, Public expenditure, Rain-fed areas, Rural Jharkhand, Watershed management

**Paper type** Research paper

### Introduction

Rain-fed agriculture serves as economic backbone of several agrarian countries such as Sub-Saharan Africa, Latin America, East and South Asia, etc. Out of world's 13.4 billion ha land surface area, about 1.2 billion ha consists of rain-fed areas supporting food supplies of nearly 40 percent global population (FAO, 2005). Freshwater management and conservation constitutes core strategy of rain-fed area development. Therefore, owing to the current threats of climate change on global freshwater supplies (IPCC, 2007); these rain-fed areas appear to be of utmost importance requiring appropriate public policies pertaining to sustainable resource management. India's rain-fed areas



envelop over 200 million hectares constituting about 62 percent of total geographical area of the country (Sharma, 2011). Despite the immense developmental potential of rain-fed areas; high incidence of chronic poverty, malnutrition, and food insecurity persists in the latter; due to poor resource management as well as lack of social and institutional infrastructure (Rockstrom *et al.*, 2007).

Global population had been predicted to rise above 8 billion by 2025 resulting in mounting pressures on world's food demand and supplies (FAO, 2009). Developing countries in particular, will be severely affected by food insecurities since more than 80 percent of population growth had been anticipated to occur in the developing world such as China and India (Godfray *et al.*, 2010). In the context of food insecurities ensuing due to increasing population; sustainable management of rain-fed areas becomes an overarching issue for India, due to higher concentration of vulnerable marginalized communities in such regions (Gray and Srinidhi, 2013). Agriculture in India still constitutes primary livelihood of rural communities due to lack of occupational diversity. Rain-fed agriculture alone contributes about 55 percent of India's total agricultural output; yet inappropriate use of available resources, poor husbandry practices and low investments have led to widespread resource degradation of otherwise productive rain-fed regions of the country (Joshi *et al.*, 2008). Besides the lack of proper irrigation infrastructure of rural India; deficient or erratic rains due to climate change recorded during recent decades, had also been reported to cause severe reductions in crop output and even total crop failure (Aggarwal and Mall, 2002).

Sustainable water harvesting practices continued to be one of major challenging issues even in rain-fed areas, since rainwater harvesting is not only influenced by many factors but the method applicability also varied depending upon geographical diversity (Li *et al.*, 2000). Additionally, the feasibility of technology adoption and management of various water harvesting systems had further been reported to be greatly challenged by construction and maintenance costs (Kunze, 2000). Further, greater technology adoption and communal ownership of resources depends to a high degree on provision of appropriate educational and extension support. Additionally, formation and strengthening of sustainable institutional framework supported by community participatory approaches are also required (Wani *et al.*, 2008). Since post-independence period India had been making several public expenditures by rolling out various public policies for addressing overall water demands of the country. However, such public policies projected toward management of rural and rain-fed water resources had always worked in isolation; aimed at their own-specific strategies. The latter in several occasions had resulted in either duplication of strategies or caused conflicts related to execution of activities; thus affecting the quality of projects. The present paper attempted to examine recent policy convergence scope of two specific public policies of Indian Ministry of Rural Development (MoRD), i.e. Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA – 2005) and Integrated Watershed Management Program (IWMP – 2009), in the context of prospective freshwater management issues of rural Jharkhand (India). Aiming at studying regional scopes and challenges of these particular government programs, the present study also intended to evaluate the potential of policy convergence strategy in the context of inter-departmental convergences for resource optimization in tribal Jharkhand.

## Methodology

### *Research approach design*

From the perspectives of qualitative exploratory analyses (Allan, 2003; French *et al.*, 2012), sociological research methods provides a variety of analytical tools such as

positivist theory-testing analyses (Yin, 1984; Dubé and Paré, 2003), interpretive theory-building analyses (Eisenhardt, 1989; Yin, 2003), or a triangulation method involving both theory-testing and theory-building analyses (Motwani *et al.*, 2002; Petter and Gallivan, 2004). The present study used triangulation method of exploration through adoption of a step-by-step theoretical framework analysis approach, for examining freshwater management opportunities in Jharkhand. In the context of convergence of two Indian public policies in particular, i.e. MGNREGA and IWMP, the present paper aimed at exploring policy convergence scopes from socio-economic-environmental perspectives (Table I). The proposed theoretical framework developed for analytical purposes involved following steps:

Step 1. Problem identification: why convergence of existing public policies is required in the context of sustainable development?

Step 2. Problem assessment using a theoretical development framework: primarily focusing on social-economic-environmental nexus, the present study examines the role of convergence strategy for policy integration of two nationalized Indian flagship programs of MoRD – MGNREGA and IWMP.

Step 1 Problem identification	Step 2 Problem assessment	Step 3 Theoretical formation of possible solutions	Step 4 Recommendation of selective interventions
Identification of linkage between convergence and sustainable development The need for convergence discussed from the perspectives of current notion of “governAbilities” from Indian examples of public policy convergence strategy	For building conceptual framework, a thorough review of available literature was performed for analyzing strengths and weaknesses of Indian freshwater management policies The prospects of rainwater harvest were analyzed from rain-fed Jharkhand’s (India) perspective by setting-up local geographical, governance, and socio-ecological scenarios of the study area	First the antecedents of two flagship programs, namely IWMP <sup>a</sup> and MGNREGA <sup>b</sup> were identified from available literature Freshwater demands were examined in the context of existing inter-departmental Indian public policies The criteria used for assessing policy convergence strategy in Indian (Jharkhand) context of freshwater management issues were: creation and maintenance of durable assets; lift-irrigation demands; agricultural water needs; use of tested technologies such as “FFW <sup>c</sup> approach”; role of good governance; other NRM <sup>d</sup> related issues, etc.	In the context of recommended solutions that were theoretically built for analytical purposes, prospective inter-departmental convergences were discussed Revolving around the socio-economic-environmental nexus, convergence strategy may create common platforms for policy makers Multi-stakeholder involvement could provide ample opportunities for addressing post-2015 developmental agenda in a sustainable development framework

**Table I.**  
Details of step-wise analysis involving various elements of “proposed conceptual framework” applied for examining prospects of “policy convergence strategy”

**Notes:** <sup>a</sup>IWMP, Integrated Watershed Management Program; <sup>b</sup>MGNREGA, Mahatma Gandhi National Rural Employment Guarantee Act; <sup>c</sup>FFW, Food for Work; <sup>d</sup>NRM, Natural Resource Management

Step 3. Theoretical formation of possible solutions: for addressing freshwater management discourse of Jharkhand (India) through evidence-based literature search, the present study used specific criteria, namely review of existing public policies in the context of broader societal developmental issues intricately associated with freshwater management issues.

Step 4. Recommendation of selective interventions: building on the current notion of “governAbilities” (Swanson *et al.*, 2014), the present study attempted at making recommendations for addressing post-2015 developmental agenda in the context of sustainable development framework. Triangulated theoretical analysis of this study presented observations and outcomes relevant for addressing complex rural development issues such as good governance, societal equity, economic and social well-being, sustainable use of natural resources, etc., from “social-economic-environmental” nexus. The underlying subsections of “Methodology” discussed the first three steps of proposed analysis, and the final “Findings and Discussion” section of this paper constituted fourth step of analytical framework.

#### *Convergence through the lenses of MGNREGA and IWMP*

Besides systematic issues of climate change, economic recession, fluctuating food and energy prices, etc., world also faces interlinked global risks of water-energy-food security crisis (World Economic Forum, 2011; Allouche *et al.*, 2014). Due to complex nature of such global issues policy makers face numerous challenges across social, economic and environmental nexus (Swanson *et al.*, 2004; Stiglitz *et al.*, 2008; Spangenberg, 2010). Hence, for addressing such cross-sectoral, interlinked, multi-stakeholder and complex issues; Swanson *et al.* (2014) suggested application of “governAbilities.” The latter constituted of three core elements of governance, i.e. sustainability, accountability and adaptability. The authors argued that a principle of sustainable development entwines the inherent interrelationships between natural, social and economic well-being. Hence, governments ought to be accountable to their citizens based on their abilities to meet evidence-based targets. Further, turbulence of twenty-first century may also require collaborative actions and integrated strategies centered on specific outcome-based issues; in order to create common reference points for governments and civil society organizations in a multi-stakeholder environment (Antonio *et al.*, 2014). Convergence of existing public policies may thus provide ample opportunities in the context of economic integration of collaborations and strategies for addressing interlinked societal issues across globe (Stirling, 2014).

From the viewpoints of above mentioned social-economic-environmental issues, MGNREGA initiative of Indian government stands out in terms of its broader objective coverage which extends beyond mere generation of wage employment across nation (Rengasamy and Kumar, 2011; Thomas and Bhatia, 2012). However, from the perspectives of creating rural assets for addressing freshwater needs of rural India, this particular program performed differently across the country. The variation in local, regional and state-level performance of this particular program could be attributed to vast variations in the availability of natural resources and socio-economic conditions throughout India (Rengasamy and Kumar, 2011; Chaarlas and Velmurugan, 2012). Therefore, full realization of MGNREGA’s immense potential, targeted toward ensuring social security besides addressing NRM issues; may require implementation synergies with other existing programs and policies. For example, watershed-based development needs of the country were being implemented under separate flagship programs namely watershed development program (WDP) of “National Bank for

Agriculture and Rural Development (NABARD)” since 1999-2000 and various watershed programs of MoRD since 2003 (Sreedevi *et al.*, 2006; Murugan *et al.*, 2014). Inferences drawn from these programs suggested incorporation of flexibility approach in common policy guidelines for enabling watershed projects across nation. Pressing needs of the latter led toward convergence of MGNREGA and IWMP schemes through issuance of common guiding principles relevant to watershed management across India (GoI, 2014). Thus for addressing water demands of rural India, convergence strategy appears to be of utmost importance in the context of above mentioned “governAbilities” (Swanson *et al.*, 2014). However, bridging various gaps related to synergetic implementation of such an initiative will be quite challenging in itself, mostly due to different attributes of MGNREGA and IWMP (Table II).

### *Review of literature on Indian rural freshwater management policies*

Indian water resource development was strengthened during the post-independence period (1947) when greater emphasis was given to the former, through budgetary inclusion in the very first five-year plan (1950-1951) of the country. The increased agricultural potential led the country toward green revolution as a result of putting greater emphasis to water management needs. However, green revolution also led to increased water demands and socio-economic disparities among various regions and states of India. Following the inception of first five-year planning, Government of India (GoI) enacted various policy reforms including the formulation of India’s “National Water Policy” (NWP) in 1987 (CWC, 1998). The basic unit of planning, development and

Program	Key attributes	Challenges	Program characteristics after policy convergence
MGNREGA <sup>a</sup>	Wage labor intensive program Ensures a minimum of 100 day’s annual job guarantee Broader area outreach Depends mainly on wage labor availability and thereby on job demands Wider objectives coverage besides guaranteed wage employment generation	Creation of durable assets Restriction on material use (60:40 labor and material ratio, respectively) Limitation on types of projects to be implemented (mainly due to compulsion of generation of wage employment) Limitations associated with 60:40 labor-material ratio use constraints holistic development of an area	Would cover both NRM <sup>c</sup> and non-NRM based activities Material costs could be addressed through IWMP MGNREGA and IWMP together could be used for holistic development of an area Policy convergence could ensure both job guarantee as well as creation of durable assets
IWMP <sup>b</sup>	Natural resource management based program Machines/larger equipments could easily be used for creation of water harvesting assets Watershed-based area developmental approach	Dependency on area topography Limited outreach Societal needs of various strata of communities needs to be taken care of Program does not involve job guarantee	Convergence could improve “governAbilities”, i.e. adaptation, accountability and sustainability

**Notes:** <sup>a</sup>MGNREGA, Mahatma Gandhi National Rural Employment Guarantee Act; <sup>b</sup>IWMP, Integrated Water Management Program; <sup>c</sup>NRM, Natural Resource Management

**Table II.**  
An analysis of strengths and challenges of MGNREGA and IWMP from perspectives of Indian policy convergence approach

management of water resources was recognized as “drainage basin” by NWP; and called for appropriate measures for optimized growth of water resources. A greater emphasis was thus also placed on various elements such as treatment and management of water catchment areas, environmental and ecological aspects, the rehabilitation of affected people and command area development; in addition to combining approaches of integrated and multi-disciplinary planning and implementation of projects, intricately associated with nation’s water demands (CWC, 1998). The NWP was revised in 2002 according to which all available water resources came under the category of utilizable resources, thus shifting the vision from increasing water availabilities to increased utilization (MoWR, 2002).

Conflicts over water usages persists throughout societies, cultures, geographies, countries, states and districts, political parties, castes, groups and even among individual farmers. Indian water conflicts among various user groups may be attributed to poor democratic, legal and administrative mechanisms which failed to address prevailing water disputes. Since water availability and usages greatly varies at household, micro-watershed, watershed, sub-basin, basin, inter-basin and inter-country level; lack of appropriate public policies and administrative frameworks further complexes communal water usages, when compared to immobile natural resources such as land (Joy *et al.*, 2008). Further, in terms of competent water usages among urban and rural demands; urban supply always gets priority (Rajagopal and Jayakumar, 2006; Chauhan, 2006). Indian water policy had also faced crises related to under-performance mainly due to lack of appropriate reform mechanisms associated with effective service delivery (GoI, 2002). Thus from national perspective; a centralized governance of water policy may be evidenced from planning, development and management strategies of water resources. Similar centralized inclinations to water policy may also be found across states of India; hence, disempowering and denying the citizens their opportunities to influence key decisions (Kessler, 2005; World Bank, 2005).

Equity and empowerment in the context of water sector can be directly linked to costs and governance, respectively. Apart from financial costs required for water resource generation and utilization; social and environmental costs had also been considered imperative to rural water infrastructure development. Under considerations of various environmental issues, environmental clearance of all water infrastructure projects was considered mandatory. For executing such clearances the “Ministry of Environment and Forests – MoE&F” came into existence in 1987 (CWC, 1998). Commendable shift in public policy reform were enacted during early 1970s onwards by GoI through launch of various watershed development projects; for tapping infinite freshwater resources from rain-fed areas (Wani *et al.*, 2007). Additionally, physical, economic, political and social factors which deter effective water access were significantly influenced by various governing functions such as participation, accountability and transparency. Hence, for addressing decentralized governing issues; three tier “Panchayati Raj Institutions-PRIs (village governing system)” was conceptualized throughout India in 1992 after passage of 73rd Constitutional Amendment Act (Naik, 2014). However, despite gradual water policy reforms and nationwide presence of government departments for execution of various water infrastructure projects; absence of departmental linkage existed. Consequently, the flaws associated with duplication of water management strategies among various governments as well as non-governmental institutions render the effectiveness of current water policies, by drawing overarching sustainability issues toward jeopardy.

*Study area profile*

Located at the eastern part of India; the State of Jharkhand (23° 45' N latitude and 85° 30' E longitude) is neighbored by Indian States of West Bengal (23° 00' N and 87° 00' E) on the eastern side, Chhattisgarh (21° 30' N and 82° 00' E) and Uttar Pradesh (27° 40' N and 80° 00' E) on the western side, Odisha (26° 00' N and 94° 20' E) on the southern, and Bihar (23° 11' N and 85° 32' E) on the north. All 24 districts of Jharkhand had been grouped under five administrative boundaries namely – South Chotanagpur, North Chotanagpur, Kolhan, Palamu and Santhal Parganas divisions (CoI, 2011a). Jharkhand had been categorized among “scheduled areas” of the country under “Panchayat Extension to Schedule Area Act (PESA) of 1996,” due to presence of tribal population of the state (Dandekar and Choudhury, 2010). Since ancient periods; Jharkhand's tribe had their own distinct self-governing systems which led to significant historical conflicts dating back to British colonization era, pertaining to tribal rights over natural resources (Corbridge, 1987; Corbridge *et al.*, 2004). After post-independence period; passage of PESA legally recognized tribe's capacity for strengthening their own systems of self-governance or creating new legal institutions. Thus, the adverse effects of century's old external cultural and political onslaught on account of vulnerable tribes was attempted to reverse with opportunities of societal welfare and reforms. However, despite PESA's radical governance powers and recognition of tribal rights over local natural resources; Jharkhand's tribe still face hardship due to prevailing political instability and lack of good governance since its formation (Tillin, 2011; Horo, 2013).

*Formulation of research basis from rain-fed Jharkhand's perspective*

Jharkhand is considered as one of the poorly developed states of India despite its endowment of rich natural resources (World Bank, 2007). Average annual rain-fall of the region amounts to about 1,200-1,400 mm falling within the category of normal to adequate rain-fall, thus providing ample un-harvested opportunities for application of sustainable freshwater management practices (Sanga and Ranjan, 2014a, b). However, current climatic trends have caused erratic rain-fall patterns throughout globe and Jharkhand is no exception (Wadood and Kumari, 2011). Despite the fact that livelihoods of rural masses of the state consist of a combination of varied agricultural and allied practices; monsoon vagaries forces vulnerable rural communities to migrate to adjacent areas for life sustenance, due to very little or no resilience toward such natural calamities (TERI, 2011; Roy, 2012). Besides agriculture; wage labor also forms direct means of livelihoods of majority of rural communities (UN-WFP and IHD, 2008). Thus, from Jharkhand's perspective, it can be affirmed that if state's natural and human resources are well managed; the socio-economic condition of the state could be significantly improved by focusing on its rural areas.

Rainwater harvest is empirical both for agricultural and non-agricultural consumptions. As mentioned previously, labor costs associated with construction and maintenance of water harvesting systems is very important in the context of technology adoption and extension of available techniques; particularly at individual farm level (Rosegrant *et al.*, 2002). Jharkhand's easy labor availability could successfully be projected toward freshwater management issues through considerable focus shifts. For instance, launch of MGNREGA (2006) throughout state had revolved only around provision of annual 100 day's wage labor to disadvantaged rural communities which could easily be directed toward sustainable rainwater management practices. On the other hand, machinery costs associated with removing large amounts

of earth for constructing larger water systems requires larger costs (Rosegrant *et al.*, 2002); which is yet another funding constraint in Jharkhand. Besides the labor and construction cost of water harvesting systems of ample land areas; an opportunity cost also exists in land-scarce areas of Jharkhand, due to very small ( $< 0.04$  ha) land holdings of rural population (TERI, 2011). Such opportunity costs had been reported to highly compete with other primary priorities of rural farmers such as agriculture and livestock (Tabor, 1995). Low socio-economic status of farmers residing in rain-fed areas is yet another contributor which significantly affected the sustainability of rainwater harvesting practices (Rosegrant *et al.*, 2002), and is also characteristic of Jharkhand (Roy, 2012).

It is quite remarkable that nationalized watershed-based area developmental program came to be effective only in 2009 after the launch of IWMP in Jharkhand, despite huge rainwater harvest potential of the state. However, prior to IWMP; micro-watershed-based program were running in very small pockets of the region, funded externally and run by welfare ministry of government of Jharkhand-GoJ (Sanga and Ranjan, 2014a). Even after half a decade since launch of program, effective implementation of IWMP is yet constrained by many factors. Absence of community participatory approaches and centralized implementation strategy could be considered as major problems, seriously affecting area expansion and coverage of IWMP (Murugan *et al.*, 2014). It is imperative to note here that “Department of Soil Conservation” (Ministry of Agriculture (MoA)) as well as “Forest Department” (MoE&F) of GoJ also remains involved with IWMP (MoRD). Thus significant lack of mutual linkage and synergy among these involved ministries may further affect prospective harvest of rainwater through watershed management approach. Thus, in the context of realizing the full potential of rain-fed Jharkhand, in terms of rural rainwater availabilities and management; there remains an underpinning issue of public policy reform, such as the provision of a common platform through convergence of appropriate public policies.

## Findings and discussions

### *Convergence approach to public policy planning*

Due to current overarching global issues related to post-2015 development agenda; national economic, social and environmental transformations could not be achieved in isolation. Therefore, sustainable development may require shared frameworks involving convergence strategy as central theme of post-2015 developmental issues (SDSN, 2013). Globally sector-specific examples of proposed notions of convergence strategies can be found from literature (Pugliese, 2001; Rees, 2002; *The Lancet*, 2014). However, despite high presence of marginalized communities in rain-fed states such as Odisha, Chattisgarh, Madhya Pradesh (MP), Bihar, West Bengal, Uttar Pradesh (UP), Maharashtra and Jharkhand; India lacks coherent public policy required for holistic development of its rain-fed areas (Sharma, 2011). Public expenditure toward rain-fed area development of the country also remains low. Internationally, various countries had adopted traditional approach of forming multi departmental public policies, for managing natural resources of highly productive rain-fed areas (FAO, 2006; Kerr, 2007). Indian watershed management programs projected toward rain-fed area development has evidenced several policy reforms since inception (Deshpande, 2008; Shah, 2008). However, irrespective of such reforms, formal convergences both institutional and policy was absent until August 2014; when diverting from traditional multi-disciplinary approach, GoI rolled out convergence policy of two nationalized flagship programs, i.e. MGNREGA and IWMP (GoI, 2014). According to policy



convergence strategy declared by GoI, watershed development programs had been covered under MGNREGA through convergence of IWMP; for provision of a common platform for program implementation. Under declared strategies of MoRD, labor costs associated with infrastructural constructions would be covered by MGNREGA due to high labor budgetary provisions of the latter; and the machinery as well as large parts of material costs will be met by IWMP. Thus, the major constraints associated with high labor costs had been proposed to address throughout country. In addition to proposed creation of rural freshwater infrastructure, renovation and maintenance costs of existing engineering structures constructed for water harvest could also be managed through MGNREGA. However, in the context of fund provisions, GoI may need to increase state's provisions owing to the recent convergence approach; since the early years of the policy rolling phase could evidence an increase in watershed development needs, particularly in under-developed rain-fed areas of Odisha, Bihar and Jharkhand. Further, Jharkhand's share of MGNREGA budget in particular, remains presently constrained since the demand for central assistance has increased during recent years in the state (Rengasamy and Kumar, 2011).

Besides the evident labor and maintenance costs, freshwater demands of rain-fed agriculture is yet another significant factor requiring due attention for policy convergence. In the context of India's recent "Food Security Bill" huge amounts of subsidized food grains would be supplemented to BPL rural households (NAC, 2011). Unless the agricultural productivity of rain-fed areas is optimized, supply of subsidized food grains will be severely affected thus constraining Indian economy. Therefore, in addition to the creation and maintenance of watershed structures; lift-irrigation for agricultural water demands are required both outside and within monsoon periods, due to recent year's erratic monsoon patterns across country. Agriculture Ministry of GoI works toward addressing all sorts of agricultural demands of the country through provision of various budgetary appropriations. Hence, in order to meet the above mentioned lift-irrigation needs of rain-fed agriculture; similar convergence opportunities may be sought. Various agricultural implements are distributed from ministerial departments such as "Soil Conservation Department" of MoA (GoI, 2008, 2011). Hence policy convergence opportunities may be sought through formal linkages under watershed development component of MGNREGA and the former, for creating and maintaining lift-irrigation infrastructure of rain-fed areas. However, the proposed convergence will not be easy since it would bring two different ministries, namely MoRD and MoA under one umbrella. Further, due to the vastness of public policies under these two ministries, only partial convergence would be more appropriate, projected toward lift-irrigation infrastructure related to watershed management across nation.

Similar convergence opportunities may also be sought for renovation, repair and restoration of created water resources since the underlying issue of ongoing maintenance requirements of water infrastructure will greatly challenge the sustainability of water resources development. Under recent year's policy reforms of MoWR funding provisions have been made toward renovation, repair and restoration of water bodies (RRR scheme) underlying in agricultural command areas (2005); besides inclusion of rainwater harvesting initiatives (2006) aimed at recharging ground water (MoWR, 2008, 2009). The former may provide fund-optimizing opportunities among MoWR and MoRD for addressing maintenance and repair of various water infrastructures in watershed development areas. Further, majority of rural water projects revolves only around ground water extractions and little attention had been

paid to rural groundwater recharge, including MGNREGA that had major emphasis on creating wage labor. Hence, in the context of groundwater recharge too, there lies immense scope for policy convergence among MGNREGA of MoRD and rainwater harvest initiatives of MoWR. Thus, from freshwater management perspective, immense opportunities can be sought for optimized use of public expenditures by means of both inter as well as intra convergences of public policies. However; strategic, partial and need-based convergences, while maintaining autonomy of various departments could only be achieved at this stance; since major convergences might risk dissolution of departments or may create conflicts. Additionally, convergence approach could be applicable for checking duplication and conflicts among similar strategies; whereas for holistic development of rain-fed areas, the traditional inter-departmental approach would be more appropriate for meeting various demands.

*Scope of convergence for freshwater management in rural Jharkhand*

*Application of indigenous knowledge and technologies.* Jharkhand's unutilized water resources amounts to 190,130 million m<sup>3</sup> of surface run-off and 13,280 million m<sup>3</sup> of ground water, still majority of agriculture remain mono-cropped (Dey and Sarkar, 2011). Run-off losses of rainwater due to undulating terrain, low soil depth, poor water holding capacity, presence of solid rocks below soil surface, etc. are yet another factors constraining non-availability of irrigation water in the region. Globally, indigenous knowledge and technologies had been considered relevant for natural resource management because of their primary dependence on nature (United Nations, 2002). Therefore, the higher presence of tribal communities in majority of Jharkhand's rural areas may provide rich basis for technology adoption and expansion due to richness of indigenous knowledge and technologies pertaining to water management and conservation (Dey and Sarkar, 2011). Further, since tanks, ponds, water canals, reservoirs, etc. have consisted majority of water harvesting structures of both IWMP and MGNREGA in Jharkhand, ample scope exists for expansion of diversified engineering structures.

Since ancient periods; small field dykes, terracing of sloping land, bamboo drips or small spring water structures such as *Doba*, etc. had consisted Jharkhand's indigenous practices for rainwater harvest and management (Dey and Sarkar, 2011). Further, earthen, stone and stone cum earthen bunds, also formed basis of soil and water conservation of Jharkhand's age-old practice. Additionally, low-cost rivulet water management strategies, grassed waterways, spur structures, brushwood waste weirs, etc. had also remained popular among tribes. Above described technologies of tribal Jharkhand can be considered highly relevant to rainwater conservation technology, pertaining to the fact that ancient tribes have survived climatic vagaries throughout ages depending solely on these technologies. Thus, there remains ample scope of amalgamation of indigenous technologies in the context of previously discussed policy convergence of MGNREGA for watershed management in Jharkhand. Additionally, the cost-effectiveness of these indigenous technologies may also provide excellent promotional and extension platforms across India, particularly in rain-fed regions.

*Application of tested Food for Work (FFW) approach.* In the context of providing basic food security rights of its people from United Nation's MGDs (Millennium Development goals) perspective, India had recently launched "National Food Security Bill – 2011" (NAC, 2011). According to Indian "Ministry of Consumer Affairs, Food and Public Distribution – MoCAF&PD" subsidized food grains (rice, wheat and coarse grains) are being distributed to eligible rural and urban households covering upto 75

and 50 percent population, respectively. Previous successful evidences of FFW approach (Subbarao, 2001; Gedamu, 2006) thus provides ample policy convergence opportunities, through amalgamation of contribution of certain amount from daily labor wage of MGNREGA toward provision of subsidized food grains. The strategy stands highly relevant in Jharkhand's context due to rural community's preference for rice as their staple food. Additionally, convergence of FFW approach with wage labor contribution element of watershed development may also be utilized for development of village funds as had been evidenced previously in Jharkhand (Sanga and Ranjan, 2014a). Thus, cost-benefit sharing opportunities may also be sought for effective implementation of FFW approach in connection to MGNREGA, since it may provoke higher community inclinations toward uptake of watershed works. The latter may be treated as need of the hour, since in absence of proper strategy, easy availability of food grains may increase community dependence on government; instead of promoting sustainable communities. Further, due to increased vulnerability of rural communities related to resource access and current climate change; optimum use of available resources and technologies warrants appropriate policy convergence, particularly from Jharkhand's perspective.

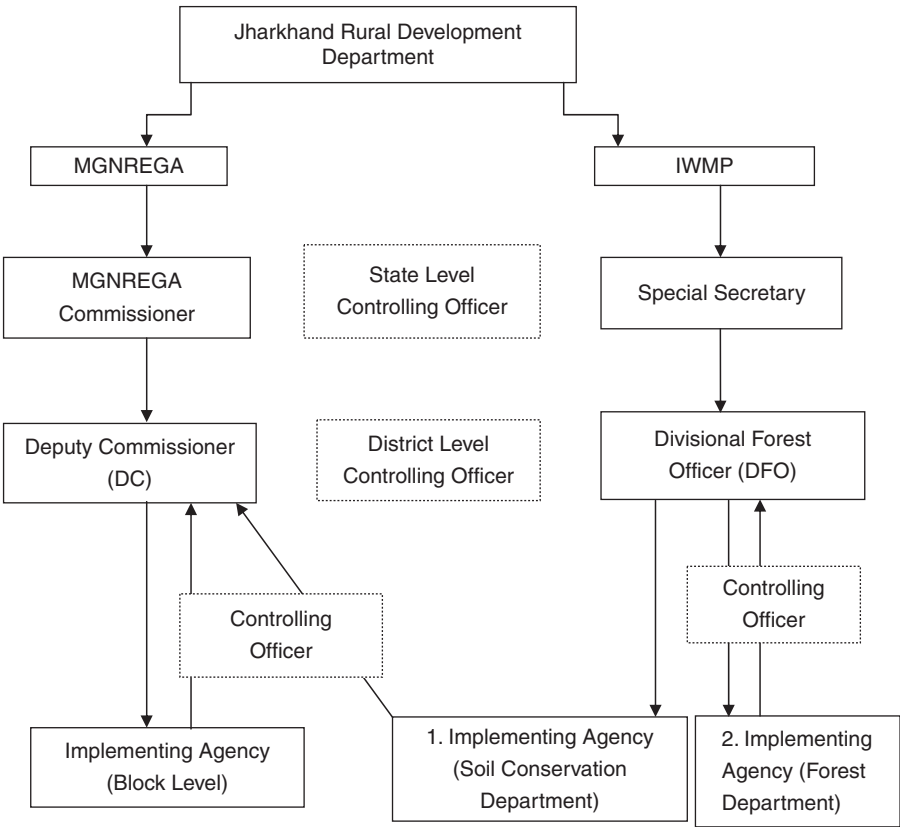
*Strengthening of grass-root technical expertise.* Grass-root empowerment had been considered crucially important for overall rural development in Indian continent (Naik, 2014). Similarities associated with identification and formulation of annual work plan of MGNREGA and resource mapping exercise of IWMP may provide skeleton for strengthening grass-root technical expertise (GoI, 2008; MoRD, 2013). The formerly mentioned development programs would require proactive involvement of grass-root communities, for planning and preparing sound work layouts projected toward area-specific developmental needs. Village CRP (community resource person) known as "Rojgar Sewak" prepares MGNREGA's work plan through consultation of community key persons such as village "Mukiya" (leader). However, the CRPs themselves lack technical expertise related to watershed development, hence the services of department of PRIs may be sought in this particular direction for formation as well as strengthening of grass-root technical expertise (UNDP, 2012). Extra incentives to Rojgar Sevak may be offered from Jharkhand's PRI department under Indian "Ministry of Panchayati Raj Institutions – MoPRI" for developing technically sound village watershed projects, in addition to their involvement in awareness generation and delivery of various in-field promotional trainings. Similar technical know-how may also be imparted to identified community members for creating skilled "Master Trainers" at grass-root level.

#### *Challenges of converging public policies – perspectives from tribal state*

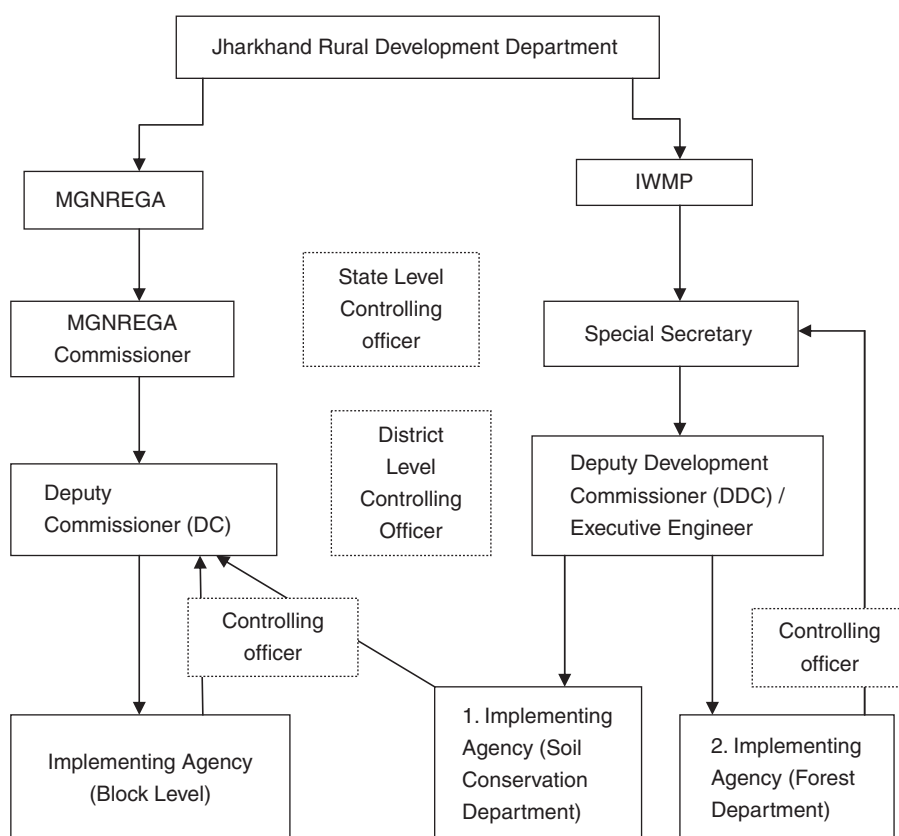
*Lack of good governance.* The involvement of PRIs had been thought to be of utmost importance in the context of rain-fed area development (Wani *et al.*, 2008). Despite the felt need of PRIs in overall sustainable development, PRIs are yet to receive proper funding as well as other governing powers in Jharkhand. Irrespective of rest of country, Jharkhand's PRI elections were held in 2011, almost a decade later after State's formation in 2000; hence these institutions are still in its infancy requiring further strengthening themselves (UNDP, 2012). State's reluctance to delegate powers to such grass-root institutions can clearly be seen from absence and failure of proper extension networks required for increasing awareness among communities regarding the role of PRIs. Additionally, despite the passage of almost a decade and half, Jharkhand had evidenced several changes in state's governance (Horo, 2013). Further, Chattisgarh

(formerly part of MP) and Uttarakhand (divided from UP) were formed in the same year (2000) as Jharkhand, yet the latter always lacked stable governance. The continuous changes of state-level governing bodies have severely affected state's development from each and every aspect, including watershed perspective. Thus, good governance policy from stable governing body remains imperative to strengthening of PRIs and thereby to grass-root communities, for realizing full potential of Jharkhand's yet to be harvested rainwater resources.

*Lack of inter-departmental coordination.* Currently IWMP faces major problems related to departmental coordination in Jharkhand. Since its launch, IWMP governing powers had changed several times in Jharkhand (Figure 1). During initial phases, the administrative sanctions of program were executed at Deputy Development Commissioner level; which was later on changed to Executive Engineer of Special Division (an engineering wing of GoJ) and Divisional Forest Officer, respectively, within short span of five to six years of program implementation period (Figure 2). Thus, lengthy administrative sanction process coupled with absence of governance feasibility has seriously affected project outcome in Jharkhand. As a result of lack of departmental coordination, not only top level but bottom level absence of program ownership may be clearly evidenced across state. Unless flexible processes for obtaining administrative and technical sanctions are adopted; in the context of recent



**Figure 1.** Schematic representation of three tier (state, district and block levels) implementation authorities of MGNREGA and IWMP in Jharkhand



**Figure 2.**  
Changes in  
organizational  
structure of three  
tier (state, district  
and block levels)  
implementation  
authorities of  
MGNREGA and  
IWMP in Jharkhand

convergence of MGNREGA and IWMP, sustainable rainwater harvest and management from watershed areas of rain-fed Jharkhand will further remain challenged.

*Jharkhand's forest covers.* Jharkhand has rich forest cover areas constituting about 29 percent against the Indian average of 23 percent (CoI, 2011b). Since high presence of tribal communities and rich forest cover are two distinct characteristics of Jharkhand, specialized developmental needs in terms of services and facilities are required for watershed development. Due to persistent conflicts between Forest Rights Act and land tenancy rights (Chotanagpur Tenancy Act); water resource development remains greatly challenged in the region, particularly in the context of creation of water infrastructure in forested areas (Tillin, 2011; Horo 2013). Additionally, left-wing extremist movements which afflict 20 out of 24 districts of Jharkhand further challenges watershed development due to high infestation of such movements in forest cover areas (Saxena, 2009). Faulty application of forest policies had also caused degradation of forestlands in the past due to illegal logging and uncontrolled grazing hence requiring due attention for sustaining forest cover (Jewitt, 2008). The latter could be achieved by means of effective community led joint forestry management (JFM) initiatives (Jewitt, 2002; Kumar, 2004). Previously, JFM practices had been exercised by forestry department in Jharkhand however, due to lack of appropriate policies the former had partly succeeded (Jewitt, 2008). Therefore, wider spread and high

### Conclusion

Presently serious challenges of freshwater supplies threaten world's food security issues of vulnerable rural communities. In the present scenario of depleting natural resources, climate change, erratic rain-fall patterns, an increase in extreme events, etc., optimum utilization of available resources becomes necessary, particularly for feeding world's billion people. Unless freshwater potential of world's rain-fed areas is optimized, agricultural production may not increase. Despite covering 62 percent of India's geographical areas, its rain-fed regions remains highly un-productive mainly because of lack of coherent public policy; projected toward sustainable resource management. In the context of recent policy convergence among two nationalized flagship schemes, i.e. MGNREGA and IWMP, the present paper aimed at examining the prospects of rain-fed area development of rural Jharkhand; with major focus on optimization of available freshwater resources in the region. Examined from perspectives of intra as well as inter-departmental linkages of available funding opportunities, the present work suggested ample converging scopes of various public policies besides MoRD; for optimizing freshwater usages from rain-fed regions of the country.

From Jharkhand's perspective, essential funding linkages were found with MoE&F, MoWR, MoA, MoCAF&PD and MoPRI, etc. Further, amalgamation of tested FFW approach with MGNREGA suggested higher adoption rates for watershed development interventions; through application of rich indigenous technology associated with watershed management. Thus, present paper indicated toward linkages of available funding opportunities rather than formulating new public policies, not only for resource optimization but also for providing common work platforms among various departments. However, Jharkhand had lacked stable governance since its formation in 2000. Thus, owing to effective implementation of MGNREGA involving IWMP and other flagship programs; building synergetic coordination among concerned departments would require coherent mechanisms. Therefore, first pilot projects involving adequate participatory strategies based on PRIs must be run for studying both flaws as well as best practices in Jharkhand. Similarly, the intricate factors influencing IWMP and MGNREGA in particular; needs to be examined comprehensively, before the full potential of designated objectives of internationally recognized initiative – MGNREGA could be realized.

### References

- Aggarwal, P.K. and Mall, R.K. (2002), "Climate change and rice yields in diverse agro-environments of India. II. Effect of uncertainties in scenarios and crop models on impact assessment", *Climate Change*, Vol. 52 No. 3 331-343.
- Allan, G. (2003), "A critique of using grounded theory as a research method", *Electronic Journal of Business Research Methods*, Vol. 2 No. 1, pp. 1-10.
- Allouche, J., Middleton, C. and Gyawal, D. (2014), "Nexus nirvana or nexus nullity? A dynamic approach to security and sustainability in the water-energy-food nexus", STEPS Working Paper No. 63, STEPS Centre, Brighton, available at: <http://steps-centre.org/wp-content/uploads/Water-and-the-Nexus.pdf> (accessed November 25, 2014).
- Antonio, E., Ofei-Manu, P. and Olsen, S.H. (2014), "Achieving Sustainable Development Goals (SDGs) through transformative governance practices and vertical collaboration at the national and subnational levels in Asia Pacific", summary of the SDplanNet-Asia Pacific Regional Workshop Series, Nairobi, April 7-9, available at: [www.iisd.org/sites/default/files/publications/sdplannet\\_asia\\_pacific.pdf](http://www.iisd.org/sites/default/files/publications/sdplannet_asia_pacific.pdf) (accessed January 20, 2015).

- Chaarlas, L.J. and Velmurugan, J.M. (2012), "Mahatma Gandhi National Rural Employment Gurantee Act, 2005 (MGNREGA): issues and challenges", *International Journal of Physical and Social Sciences*, Vol. 2 No. 6, pp. 253-261.
- Chauhan, M. (2006), "Biodiversity vs irrigation: contending water uses", *Economic and Political Weekly*, Vol. 41 No. 7, pp. 575-577, 18 February, available at: [www.conflicts.indiawaterportal.org/sites/conflicts.indiawaterportal.org/files/conflicts\\_kaladeo.pdf](http://www.conflicts.indiawaterportal.org/sites/conflicts.indiawaterportal.org/files/conflicts_kaladeo.pdf) (accessed September 9, 2014).
- CoI (2011a), *Administrative Atlas of India*, Office of the Registrar General & Census Commissioner, Census of India, New Delhi.
- CoI (2011b), *Provisional Population Totals – Paper I, Jharkhand Series – 21*, Directorate of Census Operations, Census of India, Ranchi.
- Corbridge, S. (1987), "Industrialisation, internal colonialism and ethnoregionalism: the Jharkhand, India, 1880-1980", *Journal of Historical Geography*, Vol. 13 No. 3, pp. 249-266.
- Corbridge, S., Jewitt, S. and Kumar, S. (2004), *Jharkhand: Environment, Development and Ethnicity*, Oxford University Press, New Delhi.
- CWC (1998), *Guidelines for Environmental Monitoring of Water Resource Projects*, Government of India, Central Water Commission, Environmental Management Directorate, New Delhi.
- Dandekar, A. and Choudhury, C. (2010), "PESA, left-wing extremism and governance: concerns and challenges in India's tribal districts", report Commissioned by the Ministry of Panchayati Raj, New Delhi.
- Deshpande, R.S. (2008), "Watersheds: putting the cart before the horse", *Economic and Political Weekly*, Vol. 43 No. 6, pp. 74-76, available at: [www.cse.iitb.ac.in/~karjat/waterdocs/DeshpandeWS-epw.pdf](http://www.cse.iitb.ac.in/~karjat/waterdocs/DeshpandeWS-epw.pdf) (accessed December 1, 2014).
- Dey, P. and Sarkar, A.K. (2011), "Revisiting indigenous farming knowledge of Jharkhand (India) for conservation of natural resources and combating climate change", *Indian Journal of Traditional Knowledge*, Vol. 10 No. 1, pp. 71-79.
- Dubé, L. and Paré, G. (2003), "Rigor in information systems positivist case research: current practices, trends and recommendations", *MIS Quarterly*, Vol. 27 No. 4, pp. 597-635.
- Eisenhardt, K.M. (1989), "Building theories from case study research", *Academy of Management Review*, Vol. 14 No. 4, pp. 532-550.
- FAO (2005), *Key Water resources statistics in Aquastat*, Food and Agriculture Organization, Rome, available at: <http://faostat.fao.org> (accessed November 20, 2014).
- FAO (2006), "The new generation of watershed management programmes and policies", FAO Forestry Paper No. 150, Food and Agriculture Organization of The United Nations, Rome, available at: <ftp://ftp.fao.org/docrep/fao/009/a0644e/a0644e.pdf> (accessed December 1, 2014).
- FAO (2009), *State of Food Insecurity in the World 2009*, Food and Agriculture Organization, Rome.
- French, S.D., Green, S.E., O'Connor, D.A., McKenzie, J.E., Francis, J.J., Michie, S., Buchbinder, R., Schattner, P., Spike, N. and Grimshaw, J.M. (2012), "Developing theory-informed behavior change interventions to implement evidence into practice: a systemic approach using the theoretical domains framework", *Implementation Science*, Vol. 7 No. 38, pp. 1-12.
- Gedamu, A. (2006), "Food for Work program and its implications on food security: a critical review with a practical example from the amhara region, Ethiopia", *Journal of Agriculture and Rural Development in the Tropics and Subtropics*, Vol. 107 No. 2, pp. 177-188.
- Godfray, H.C.J., Beddington, J.R., Crute, I.R., Haddad, L., Lawrence, D., Muir, J.F., Pretty, J., Robinson, S., Thomas, S.M. and Toulmin, C. (2010), "Food security: the challenge of feeding 9 billion people", *Science*, Vol. 327 No. 5967, pp. 812-818.
- GoI (2002), "Indian Reform initiatives in water sector", presented at Water Forum, Ministry of Rural Development, Government of India, World Bank, Washington, DC.

- GoI (2008), *Common Guidelines for Watershed Development Projects*, Planning Commission, Government of India, New Delhi, pp. 1-57.
- GoI (2011), *Guidelines for Rainfed Area Development Programme (RADP)*, Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India, New Delhi, India, pp. 1-19, available at: [www.jharkhandsoil.gov.in/uploadedfiles/RADP\\_GUIDELINES.pdf](http://www.jharkhandsoil.gov.in/uploadedfiles/RADP_GUIDELINES.pdf) (accessed December 1, 2014).
- GoI (2014), *Guidelines on Watershed Management Works Taken Up Independently Under MGNREGA or In Convergence with IWMP*, Mahatma Gandhi NREGA Division, Department of Rural Development, Ministry of Rural Development, New Delhi.
- Gray, E. and Srinidhi, A. (2013), "Watershed development in India: economic valuation and adaptation considerations", working paper, World Resources Institute, Washington DC, pp. 1-32, available at: [www.wri.org/publication/watershed-development-india-economic-valuation-adaptation-considerations.pdf](http://www.wri.org/publication/watershed-development-india-economic-valuation-adaptation-considerations.pdf) (accessed November 20, 2014).
- Horo, A. (2013), "Jharkhand movement", *International Journal of Humanities and Social Science Invention*, Vol. 2 No. 4, pp. 1-6, available at: [www.ijhssi.org/papers/v2\(4\)/version-2/A240106.pdf](http://www.ijhssi.org/papers/v2(4)/version-2/A240106.pdf) (accessed September 3, 2014).
- IPCC (2007), "Climate change 2007: synthesis report", Inter-Governmental Panel on Climate Change, available at: [www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4-syr-topic/pdf](http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4-syr-topic/pdf) (accessed June 2, 2014).
- Jewitt, S. (2002), *Environment, Knowledge and gender: Local development in India's Jharkhand*, Ashgate Publishing Company (SOAS Development Geography Series), Aldershot.
- Jewitt, S. (2008), "Political ecology of Jharkhand conflicts", *Asia Pacific Viewpoint*, Vol. 49 No. 1, pp. 68-82, available at: [www.umsledu/~naumannj/professional%20geography%20articles/Political%20ecology%20of%20Jharkhand%20conflicts.pdf](http://www.umsledu/~naumannj/professional%20geography%20articles/Political%20ecology%20of%20Jharkhand%20conflicts.pdf) (accessed November 24, 2014).
- Joshi, P.K., Jha, A.K., Wani, S.P., Sreedevi, T.K. and Shaheen, F.A. (2008), "Impact of Watershed Program and conditions for success: a meta-analysis approach. global theme on agroecosystems", Report No. 46, International Crops Research Institute for the Semi-Arid Tropics and National Centre for Agricultural Economics and Policy Research, Hyderabad.
- Joy, K.J., Gujja, B., Paranjape, S., Goud, V. and Vispute, S. (2008), *Water Conflicts in India: A Million Revolts in the Making*, Routledge, London, New York, NY and New Delhi.
- Kerr, J. (2007), "Watershed management: lessons from common property theory", *International Journal of the Commons*, Vol. I No. I, pp. 89-107, available at: [www.thecommonsjournal.org/index.php/ijc/article/view/8/1](http://www.thecommonsjournal.org/index.php/ijc/article/view/8/1) (accessed December 1, 2014).
- Kessler, T. (2005), *Social Policy Dimensions of Water and Energy Utilities: Knowledge Gaps and Research Opportunities*, The World Bank, Washington, DC.
- Kumar, S. (2004), "Does 'participation' in common pool resource management help the poor? A social cost-benefit analysis of joint forest management in Jharkhand, India", in Corbridge, S., Jewitt, S. and Kumar, S. (Eds), *Environment, Development and Ethnicity*, Oxford University Press, New Delhi, pp. 232-263.
- Kunze, D. (2000), "Economic assessment of water harvesting techniques: a demonstration of various methods", *Quarterly Journal of International Agriculture*, Vol. 39 No. 1, pp. 69-91.
- Li, X.L., Gong, J.D. and Wei, X.H. (2000), "In-situ rainwater harvesting and gravel mulch combination for corn production in the dry semi-arid region of China", *Journal of Arid Environments*, Vol. 46 No. 4, pp. 371-382.
- MoRD (2013), *Mahatma Gandhi National Rural Employment Guarantee Act, 2005, Operational Guidelines 2013*, 4th ed., Ministry of Rural Development, Department of Rural Development, Government of India, New Delhi.



- Motwani, J., Mirchandani, D., Madan, M. and Gunasekaran, A. (2002), "Successful implementation of ERP projects: evidence from two case studies", *International Journal of Production Economics*, Vol. 75, pp. 83-96.
- MoWR (2002), *National Water Policy 2002*, Ministry of Water Resources, Government of India, New Delhi.
- MoWR (2008), *National Water Mission under National Action Plan on Climate Change, Report of Sub-committee on Policy and institutional Framework*, Ministry of Water Resources, Government of India, New Delhi.
- MoWR (2009), *Guidelines for Repair, Renovation and Restoration of Water bodies with Domestic Support*, Ministry of Water Resources, Government of India, New Delhi.
- Murugan, S.V., Ramasubramaniyan, M.R. and Vaseekaran, M.K.S. (2014), "Water management policies in india: current trends and future policy options", *Journal of Academia and Industrial Research*, Vol. 3 No. 2, pp. 73-77.
- NAC (2011), "National Food Security Bill-2011", National Advisory Council, New Delhi, July, pp. 1-56, available at: [http://nac.nic.in/pdf/nfsb\\_final.pdf](http://nac.nic.in/pdf/nfsb_final.pdf) (accessed September 3, 2014).
- Naik, P.R.K. (2014), "Decentralization and participative in rural development", *International Research Journal of Social Sciences*, Vol. 3 No. 7, pp. 43-48, available at: [www.isca.in](http://www.isca.in), [www.isca.me](http://www.isca.me) (accessed August 21, 2014).
- Petter, S.C. and Gallivan, M.J. (2004), "Toward a framework for classifying and guiding mixed method research in information systems", *Proceedings of the 37th Hawaii International Conference on System Sciences, HI*, Big Island, Hawaii.
- Pugliese, P. (2001), "Organic farming and sustainable rural development: a multifaceted and promising convergence", *Sociologia Ruralis*, Vol. 41 No. 1, pp. 112-130.
- Rajagopal, A. and Jayakumar, N. (2006), "Conflict in the Bhavani: equity, access and allocation", *Economic and Political Weekly*, Vol. 41 No. 7, pp. 581-582.
- Rees, W.E. (2002), "Globalization and sustainability: conflict or convergence?", *Bulletin of Science, Technology & Society*, Vol. 22 No. 4, pp. 249-268.
- Rengasamy, K. and Kumar, B.S. (2011), "State level performance of MGNREGA in India: a comparative study", *International Multidisciplinary Research Journal*, Vol. 1 No. 10, pp. 36-40, available at: <http://irjs.info/> (accessed November 20, 2014).
- Rockstrom, J., Falkenmark, M. and Lannerstad, M. (2007), "Assessing the water challenge of a new green revolution in developing countries", *Proceedings of the National Academy of Sciences of the United States of America*, Vol. 104 No. 15, pp. 6253-6260.
- Rosegrant, M., Cai, X., Cline, S. and Nakagawa, N. (2002), "The role of rainfed agriculture in the future of global food production", Environment and Production Technology Division Discussion Paper No. 90, International Food Policy Research Institute, Washington, DC.
- Roy, D. (2012), "Socio-economic status of scheduled tribes in Jharkhand", *Indian Journal of Spatial Science*, Vol. 3 No. 2, pp. 26-34.
- Sanga, N.P. and Ranjan, R.K. (2014a), "Natural Resource management in changing climate – reflections from indigenous Jharkhand", *World Journal of Science Technology and Sustainable Development*, Vol. 11 No. 2, pp. 117-133.
- Sanga, N.P. and Ranjan, R.K. (2014b), "Building resilience to climate change – a case of rain-fed fisheries development in tribal Jharkhand", *Indian Journal of Social Vision*, Vol. 1 No. 2, pp. 73-84.
- Saxena, K.D. (2009), "The naxalite movement and the crisis of governance: reform measures for regaining people's trust", *Social Change*, Vol. 39 No. 4, pp. 475-503, available at: [www.indiaenvironmentportal.org.in/files/Naxalite.pdf](http://www.indiaenvironmentportal.org.in/files/Naxalite.pdf) (accessed November 24, 2014).

- SDSN (2013), "The structural transformations towards sustainable development", background paper for the High-Level Panel of Eminent Persons on the Post-2015 Development Agenda, Prepared by the Secretariat, Sustainable Development Solutions Network, A Global Initiative for the United Nations, New York, NY, available at: [www.unsdsn.org/resources/](http://www.unsdsn.org/resources/)
- Shah, M. (2008), "Rainfed authority and watershed reforms", *Economic and Political Weekly*, Vol. 43 Nos 12/13, pp. 105-110.
- Sharma, K.D. (2011), "Rain-fed agriculture could meet the challenges of food security in India", *Current Science*, Vol. 100 No. 11, pp. 1615-1616.
- Spangenberg, J.H. (2010), "A European methodology for sustainable development strategy reviews", *Environmental Policy and Governance*, Vol. 20 No. 2, pp. 123-134.
- Sreedevi, T.K., Wani, S.P., Sudi, R., Patel, M.S., Jayesh, T., Singh, S.N. and Shah, T. (2006), "On site and off site impact of watershed development: a case study of Rajasamadhiyala, Gujarat, India", Global Theme of Agro Ecosystems Report No. 20, International Crops Research Institute for the Semi Arid Tropics (ICRISAT), Patancheru.
- Stiglitz, J., Sen, A. and Fitoussi, J.P. (2008), "Report by the Commission on the Measurement of Economic Performance and Social Progress", available at: [http://stiglitz-sen-fitoussi.fr/documents/rapport\\_anglais.pdf](http://stiglitz-sen-fitoussi.fr/documents/rapport_anglais.pdf) (accessed November 2, 2014).
- Stirling, A. (2014), "Emancipating transformations: from controlling 'the transition' to culturing plural radical progress", STEPS Working Paper No. 64, STEPS Centre, Brighton, available at: <http://steps-centre.org/wp-content/uploads/Transformations.pdf> (accessed January 20, 2015).
- Subbarao, K. (2001), "Systemic shocks and social protection: role and effectiveness of public works programs", Africa Region Human Development working paper series, available at: <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.202.5609&rep=1&type=4pdf> (accessed June 12, 2013).
- Swanson, D., Bizikova, L., Thrift, C. and Roy, D. (2014), "GovernAbilities: the nexus of sustainability, accountability and adaptability", IISD, available at: [www.iisd.org/sites/default/files/publications/governabilities\\_sustainability\\_accountability\\_adaptability.pdf](http://www.iisd.org/sites/default/files/publications/governabilities_sustainability_accountability_adaptability.pdf) (accessed November 25, 2014).
- Swanson, D., Pinter, L., Bregha, F., Volkery, A. and Jacob, K. (2004), *National Sustainable Development Strategies*, Stratos, Environment Policy Research Centre of the Free University of Berlin, and Deutsche Gesellschaft für Technische Zusammenarbeit, IISD, Winnipeg.
- Tabor, J.A. (1995), "Improving crop yields in the Sahel by means of water-harvesting", *Journal of Arid Environments*, Vol. 30 No. 1, pp. 83-106.
- TERI (2011), *Designing Adaptation to Climate Change Responses for Inclusion in IFAD's Project in Jharkhand*, TERI, New Delhi.
- The Lancet* (2014), "Grand Convergence: a future sustainable development goal?", *The Lancet*, Vol. 383, January 18, p. 187.
- Thomas, B. and Bhatia, R. (2012), "Impact of NREGA scheme: a study on overall quality of life of its beneficiaries", *Asia-Pacific Journal of Social Sciences*, Vol. IV No. 2, pp. 213-227.
- Tillin, L. (2011), "Questioning borders: social movements, political parties and the creation of new states in India", *Pacific Affairs*, Vol 84 No. 1, pp. 67-87, available at: [www.pacificaffairs.ubc.ca/files/2011/07/Tillin.pdf](http://www.pacificaffairs.ubc.ca/files/2011/07/Tillin.pdf) (accessed November 24, 2014).
- UNDP (2012), "Capacity assessment and capacity development strategy (CA-CDS) report for strengthening Panchayati Raj Institutions in Jharkhand", a report prepared in close collaboration between UNDP, India and Ministry of Panchayati Raj, Government of India, New Delhi, available at: [www.in.undp.org/content/dam/india/docs/DG/CA-CDS-report-Jharkhand.pdf](http://www.in.undp.org/content/dam/india/docs/DG/CA-CDS-report-Jharkhand.pdf) (accessed December 1, 2014).
- United Nations (2002), "Background on indigenous people", first meeting of Permanent Forum High Point of UN Decade, available at: [www.un.org/rights/indigenous/backgrounder1.htm](http://www.un.org/rights/indigenous/backgrounder1.htm) (accessed November 2, 2009).

- UN-WFP and IHD (2008), *Food Security Atlas of Rural Jharkhand*, Institute for Human Development, New Delhi.
- Wadood, A. and Kumari, P. (2011), "Impact of climate change on Jharkhand agriculture: mitigation and adoption", *ISPRS (International Society for Photogrammetry and Remote Sensing) Archives XXXVIII-8W/3 Workshop Proceedings: Impact of Climate Change on Agriculture, Ahmedabad, Dec 17-18*, pp. 207-210, available at: [www.isprs.org/proceedings/XXXVIII/8-W/3/](http://www.isprs.org/proceedings/XXXVIII/8-W/3/) (accessed May 24, 2012).
- Wani, S.P., Sreedevi, T.K., Reddy, T.S.V., Venkateswarlu, B. and Prasad, C.S. (2008), "Community watersheds for improved livelihoods through consortium approach in drought prone rain-fed areas", *Journal of Hydrological Research and Development*, Vol. 23, pp. 55-77.
- Wani, S.P., Joshi, P.K., Ramakrishna, Y.S., Sreedevi, T.K., Singh, P. and Pathak, P. (2007), "A new paradigm in watershed management: a must for development of rain-fed areas for inclusive growth", in Swarup, A., Bhan, S. and Bali J.S. (Eds), *Conservation Farming: Enhancing Productivity and Profitability of Rain-Fed Areas*, Soil Conservation Society of India, New Delhi, pp. 163-178.
- World Bank (2005), *India's Water Economy: Bracing for a Turbulent Future*, Agriculture and Rural Development Unit, The World Bank, New Delhi.
- World Bank (2007), *Inclusive Development for Jharkhand*, World Bank, New Delhi.
- World Economic Forum (2011), "Global risks 2011", 6th ed., available at: <http://reports.weforum.org/global-risks-2011/> (accessed January 2, 2012).
- Yin, R.K. (1984), *Case Study Research: Design and Methods*, SAGE Publications, Thousand Oaks, CA.
- Yin, R.K. (2003), *Case Study Research – Design and Methods*, SAGE Publications, Thousand Oaks, CA.

### Further reading

Yin, R.K. (1994), *Case Study Research: Design and Methods*, SAGE Publications, Thousand Oaks, CA.

### About the authors

Dr Nafisa Priti Sanga, after pursuing her PhD in Aquaculture (December 2009) from the Tasmania University, Australia, Nafisa Priti Sanga started her career as a "Developmental Professional" in India by starting rural extension work through employment at the "Jharkhand Tribal Development Society", an autonomous unit under the Welfare Ministry of Govt. of Jharkhand (India). Initially starting as a Fishery Extension Officer, she has gained expertise in other areas of agriculture and allied sciences including the social sciences. Currently she is proactive in rural development research and development work and specializes in tribal development, particularly in the areas of livelihood sustainability of marginalized groups achieved by means of integrated natural resource management. Dr Nafisa Priti Sanga is the corresponding author and can be contacted at: [monsoonbeats@gmail.com](mailto:monsoonbeats@gmail.com)

Rajeev Kumar Ranjan, M. Tech. in Agricultural Engineering (2007), graduated from one of India's prime institutions the Indian Institute of Technology (IIT), Kharakpur, West Bengal. After spending couple of months in corporate highly paid job based in the heart of India's capital Delhi, he chose to be a "Developmental Professional" due to his high emphatic values and urge to serve the poor and oppressed. He has worked with India's prime NGOs such as PRADAN, GVT, etc. before working at the Jharkhand Tribal Development Society. During June 2012 he received one of India's prestigious research fellowship – "Prime Minister's Rural Development Fellowship" awarded by the Ministry of Rural Development of the Govt. of India. Currently, he is based at East Singhbhum district of Jharkhand (India) and proactively working on high profile development schemes of the Govt. of India.

For instructions on how to order reprints of this article, please visit our website:

[www.emeraldgrouppublishing.com/licensing/reprints.htm](http://www.emeraldgrouppublishing.com/licensing/reprints.htm)

Or contact us for further details: [permissions@emeraldinsight.com](mailto:permissions@emeraldinsight.com)