

Dalits and Natural Resource Governance: Social Taxonomy, Socio-Economic Heterogeneity and Distributional Implication of Irrigation Development in Nepal

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Abstract

This paper reviews literature and sets the scene for understanding the relationship between local-level socio-economic heterogeneity and equitable management of irrigation infrastructure. It calls for a critical approach that evaluates the processes which persistently marginalize dalits despite pro-poor interventions. Marginality and poverty have persisted despite numerous agricultural developmental interventions (some pro-poor) and much research, often initiating local institutional arrangements in managing common pool resources. Relationships between irrigation and poverty and caste hierarchy, power relation and benefit appropriation from CPRs are discussed in order to identify the principal barriers to access amongst the dalit population. Impacts of heterogeneity in the management of local commons are investigated. Social taxonomy based on castes system, and the nature of shielding effects imposed by it in the trickling down of developmental effects of irrigation infrastructure is critically examined. Participatory and equitable pro-poor management structures are advocated. This study has significant policy relevance for pro-poor interventions in irrigation development not only in Nepal but generically in developing countries.

Key Words: Casteism, Dalits, Natural Resource, Irrigation Management, CPR, Heterogeneity, Nepal

1. Introduction

Irrigation water impinges many aspects of human life in myriad of complex ways including providing livelihood systems, improve food production that underpins food security, sustains ecosystem and contributes to local economy amongst other. Emphasizing on the importance of irrigation water, Bromley (1982) contends that “irrigation has become a dominant part of the man’s relentless pursuit of enough to eat” (p1). Irrigation water is particularly important in agricultural areas where rainfall is irregular, scant and insufficient in order supplement water from rainfall and to avoid crop failures. Thus adequate, timely and equitable water distribution is absolutely critical for enhancing agricultural productivity and improving food security which underpins livelihoods of many local farmers (Hussain and Hanjra, 2004; Lipton, et.al., 2002; Hussain et.al. 2002). Thus irrigation has been advocated as vehicle for rural development.

In recent decades, there has been resurgence of growing interests on dependency of rural households upon the natural resource bases, particularly on common pool resources (CPRs).

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It is generally reported that the poorer households make greater use of and are more reliant on natural resource bases, which contribute substantially to their livelihoods sustenance. Particularly, the poorer households derive a greater proportion of their income from the local commons, compared to their richer counterparts (Cavendish 2000; Beck and Nesmith 2001; Fisher 2004; Shackleton and Shackleton 2006). However, in absolute terms, the richer households, particularly with market accessibility, benefit more than their poorer counterparts (Cavendish 2000; Dasgupta, 1993). There is a common assumption that greater reliance upon CPRs equates to greater benefit derivation by the poorer households making them the primary beneficiary from CPRs (Campbell et.al., 2001). Contrary to this assumption, however, a growing number studies report that, neither the degree of resource dependency equates to the level of benefit appropriation nor the asset poor households become the primary beneficiary of the local commons (Adhikari, et.al, 2004; Kumar, 2002).

Thus benefits derivation from the local commons not depends not only on bio-physical characteristics but also on user characteristics (socio-economic, political, religious etc.) and institutional configurations adopted for CPR management. Elite biased CPR management makes local commons elite enterprise and severely affects long term viability of their management institutions. Based on literature review, this paper reports the implications of heterogeneity on CPR management. Firstly, irrigation management in the context of *dalit* communities in Nepal is discussed briefly. Secondly the paper reports on the linkage between poverty reduction and irrigation development. Based on literature review, the paper then reports the implications of heterogeneity on CPR management, in particular socio-economic heterogeneities and power relations are described and commons dilemma in coordinating collective actions are elucidated. The paper concludes calling for a holistic, inclusive governance structures for managing irrigation systems and few potential research questions emanating from the literature view are presented.

2. Context: Dalits and Natural Resources Management in Nepal

The important of irrigation for predominantly agricultural country like Nepal is of paramount importance. Along with being a predominantly agricultural country, Nepal demonstrates a distinct social taxonomical stratification based on the caste system which is embedded within the Hindu religion, and encompasses a wider socio-economic heterogeneity (Adhikari, 2002 & 2003). Furthermore the origin of the caste system still remains a contentious issue.¹ It continues to act as an obstacle in the development of indigenous and the *dalit* communities due to structural differences in the society for example unequal power distribution, difference social capitals, and subordination and systematic exclusions of dalits by higher castes groups.

1. The caste structure is based on the Hindu *Varna* System which divides people into four categories according to their occupational activities viz.: Brahmin (learned people, priests), Chhetri (warriors), Vaishya (traders, agriculturists), and Sudras (engaged in menial services). Originally it merely meant the type of work one does but gradually it became hereditary (SNV, 1998). This hereditary transformation of *Varna* (from parents to offspring irrespective of their work speciality) distorted into the present complex and rigid caste system in Nepal. Though, untouchability and discrimination on the basis of caste was formally outlawed by the 1963 National Code and the Constitution of the Kingdom of Nepal, it still prevails widely in Nepalese society.

An important part of caste system is that *dalits*² are considered to be untouchable and they face multitude of disadvantages in land endowment, socio-economic marginalization, political participation and alternative employment opportunities (Lawati, 2005). The practice of untouchability systematically excludes the dalits from access to markets, particularly that of dairy products. Pervasive landless amongst the dalits has meant that they have limited access to micro credits, which are absolutely vital for initiating extra-farming activities, purchasing fertilisers, credits needed for repairing sub-canal leading to their plots etc. If the status quo is maintained and rigidity for social transformations including the aspects of resource governance is continued, a wave of disenfranchised and disincentives for collective actions prevails leading defrauding, non-compliance to rules, non-maintenance of canal etc. and ultimately leading to what Hardin called “the tragedy of the commons” (Hardin, 1968).

Also, the Dalits are mostly *sukumbasi* (landless) or land-poor if they have any lands, and are living in the rural areas know as *khorias* (unproductive and rainfed areas) and public lands. Understandably, this sector of population represents a significant proportion of population under poverty (NPC, 2002). Efforts to alleviate poverty and maintain sustainable use of natural resource bases (irrigation in this case) through the involvement of local communities, while at times successful, continue to face challenges associated with landlessness and land poorness amongst the *dalits* and indigenous communities. The benefits from the irrigation development accrue to landlords and land rich households, which are usually, but not always from higher caste groups, while negative externalities associated with it are born by mostly, landless and land-poor households. Furthermore, the opportunity cost associated with engagement in irrigational maintenance programmes are higher amongst landless and land poor people. Aggregation of all these heterogeneities coupled with political insurgency has meant that social equity aspects of irrigation development are seriously questioned.

3. Irrigation for Poverty Reduction

The relationship between poverty reduction and irrigational development has become a topical issue amongst academics and policy makers alike. A ministerial Bonn Conference on fresh water management declared that, “combating poverty is the main challenge for achieving equitable and sustainable development and irrigation water plays a vital role in relation to human health, livelihoods, economic growth as well as sustaining ecosystems” (Reba, 2003). There is a general consensus that irrigation development particularly in agricultural countries help reduce poverty significantly (Fan et.al, 1999; Ravallion and Datt, 1996; Mellor, 2001; Desai, 2002).

Considerable work done in the last five decades in Asia and else where have shown that the multitude of tangible positive externalities associated with irrigation development are considered to be the most potent source of higher farm incomes and hence it is the driving force for poverty reduction (Mellor, 2001; Sakthivadivel et.al, 2002).

2. There is a considerable debate in defining *dalits*. For Bharati (2002 p3) dalit is not a caste in itself, but groups of castes being exploited by existing social and economic traditions. Schultz (2003), refers *dalits* as untouchables; Gurung (2004, p3) synonymies *dalits* with untouchables, low-castes, harijans, schedule castes and, oppressed; while for Rasali (2005) *dalits* are Karmajans (traditional occupational castes) suffering socio-economic and political suppressions emanating from orthodoxy Hindu religion

A study of poverty reduction in India concluded that agricultural output and irrigational development coupled with enhanced literacy rate contributed towards poverty reduction. They further go on to argue that, poverty reduction in rural India strongly depends upon the effective irrigation access and efficient irrigation development (ibid, p6).

The direct benefits of irrigational development operate at local and households level with higher production, higher crop yields, and reduce risk of crop failure, all year-round and non-farm employment opportunities and food security. Globally, 17 per cent of global irrigated land contributes to about 40 per cent of world cereal production (Lipton, et.al., 2002). In the last half a century, global irrigated land has increased by about 250 per cent reaching to 266 million hectares by 1997 (FAO, 2000). Furthermore, crop diversification, cropping intensification and shifts from subsistence to commercial cropping is likely to help poorer households by reducing food prices (Hussain and Hanjra, 2004). Writing on Indian irrigation systems, Dahawan and Datta, (1992) posit that, in the irrigated rural settings up to 3 crops a year can be grown as compared to just a single crop in a year in the rainfed settings. Indirectly, irrigation development acts as production and supply shifter and help boost aggregate growth where, both rich and poor households benefits however, later in the long run rather than in short run, a form of Kuznet curve (Kuznet, 1955).

Drawing macro level data, Lipton et al. (2002) compared the prevalence of poverty and amount of land irrigated in Africa and Asia. They contend that region with higher irrigated cropland has higher poverty reduction. Similar study was carried out by the World Bank during 1990s.

The World Bank report demonstrated that Sub-Saharan Africa experienced the world's worst form and level of poverty with absolute poverty level of 47.7 per cent in 1990 and 46.3 per cent in 1998, with just 3 per cent of irrigated cropland. In contrast, the experiences from East Asian and Pacific, North Africa and Middle East with 35-40 per cent of irrigated croplands showed higher poverty reduction in the 1970s (World Bank, 2000). Hussain et.al. (2002) studied intra country experience of poverty reduction due to irrigation and found out the incidence of chronic poverty in the rainfed areas of Sri Lanka and Pakistan are likely to 10 per cent and 5 per cent respectively more than their adjoining irrigated areas. Furthermore, Hussain et al. (2002) note that poverty head counts ranges from 18-53 per cent in irrigated and 21 -66 per cent in rainfed settings – a difference of 20-30 per cent between the two settings. Abundantly, research has shown that, 1 per cent increase in agricultural production can reduce poverty by an equal amount (Thirtle et.al, 2001).

On the production side of poverty-irrigation relationship, irrigation development creates localised demands for both farm and off-farm income generating economic activities indirectly. A study by Liedholm and Meade (1987) concluded that due to the spill over effects of expanding agricultural activities non-farm employment opportunities expand readily. It is well established that, due to the prominent of agricultural sector and adaptation of green revolution in low income countries agricultural growth rate of 4-6 per cent adds immense purchasing power (Mellor, 1995).

Angood et.al. (2002) presented a case study of three Farmers Managed Irrigation (FMI) schemes in Nepal namely Janakalyan, Kalleritar and Yampaphant irrigation schemes, where they concluded that, small scale irrigation development on those three (FMI) schemes, were effective tools for rural poverty reduction. Following Angood et al.'s study, Brabban et.al (2004) re-examining the impacts of the same three irrigation schemes concluded that, irrigational development can have significant positive impacts in all

dimensions of development- human assets, natural assets, financial assets, physical assets and social assets (Brabban et.al., 2004).

However, research on the relationship between irrigation and poverty involves aggregate macro level analysis. Furthermore, although much work has been done in relation to the implications of local level socio-economic heterogeneities on forest management (Adhikari, 2003; Luintel, 2003), very little work has been done in irrigation development. The growth aspects of irrigation are well accepted. Despite the close inter linkages between irrigation development and poverty reduction there is still a considerable polarisation on equity dimension. Head and tail inequity, also known as upstream-down stream inequity has been well documented (Hussain, 2004). A growing body of literature argues that growth can lead to a skewed income distribution raising questions about the anti-poverty strength of irrigation development (Fields, 1989; Squire, 1993; Lipton and Ravallion, 1995; Ravallion, 1995). Skeptics argue that it is naïve to assume that irrigation development is distribution neutral. Also, since the distribution of irrigation water is land based, irrigation development is inherently biased against the landless and land poor. In his synthesis studies of 307 irrigational systems during 1970-89, Freebairn (1995) found that both inter-farm and interregional inequalities widened in 80 of the studies. However, these studies suffered from fundamentally methodological sampling errors (Hussain, 2004). Banik et al. (2003) in their study of natural resource endowments and poverty in a tribal belt of Chhotanagpur Plateau (India) demonstrated a significant differences in the benefits accruing to higher landholding households from higher social strata as compared to those from lower caste affiliations (Banik et al, 2003).

Since Nepal exhibits a highly skewed land distribution (as mentioned in the policy implication section below), the probability for unequal water distribution is high. Furthermore, existence of caste system with dominance of higher castes in policy domains, and disproportionately higher land distribution amongst them has meant that the same groups are deriving much of the benefits from the irrigational development in Nepal. Ethnic minorities, indigenous people, and *dalits*, who represent a significant number of landless households marred with poverty, have tended to lag behind in benefiting from irrigational development in Nepal. Much work needs to be done to inform policy makers, about the trajectories through which the benefits of irrigation development trickle down in a caste based society such as Nepal.

4. Commons Dilemma in Irrigation Management

Irrigation canals are managed through different institutional arrangements such as privately managed, communally managed, state managed and jointly managed. For the purpose of this research, communally managed irrigation system draws our immediate attention, however. Irrigation water demonstrates inherent characteristics of common pool resources (CPRs) i.e. rivalry and non-exclusionary in nature (Ostrom and Gardner, 1993) and are usually managed by group of individuals communally. The finite flow of water in irrigation canal is being used by multiple users and at any one time, water harvesting by an individual has implications upon the availability of water to other appropriators. The costs associated with excluding some individuals from water harvesting raises from many sources. For example, cost of fencing or parcelling the resource bases and costs associated with designing and implementing well defined property rights. Also the non-stationary nature of the irrigation water and its demand in crucial times (for example, transplanting) poses

added complexities. In the absence of appropriate institutional arrangement to design, and implement property rights, and monitoring mechanism for defrauding many complex problems arise while managing local commons.

First, free riding is a common occurrence. From rational choice perspective, individual cultivators attempt to maximise their own utility by harvesting water often beyond the optimal requirement of their fields. Free riders problem becomes acute particularly during water scarcity periods, since a demand exceeds supply. At the heightened competition for irrigation water, defrauding and water theft is not uncommon phenomenon which creates conflicts sometimes involving physical power/abuse. This imparts wave of disincentives, and discouragements to the regular contributor to irrigation canal repairing and maintenance while others free ride i.e. appropriating water without contribution their share of labour/costs for irrigation canal maintenance. Secondly, for achieving best crop yield from cultivated field, farmers need water regularly and at the right time, particularly during crop plantation and *graining* formation. This increases the propensity to harvest water with a total disregard to fellow cultivators. The resentment and dissatisfactions amongst downstream farmers, or farmers whose plot are situated at disadvantaged positions, is particularly conspicuous (Wade, 1988). The looming uncertainty prevails amongst the down-stream farmers with potential disenfranchise. This uncertainty *doldrums* is incredibly damaging for collective actions as Bromley (1982) posits “more productive cultural practices because of an inability to count on the necessary water receipts when they are most needed”. Thus unplanned and uncoordinated water harvesting by one appropriator from communally managed irrigation canal distorts equilibrium and dissociate the spirit for collective action.

This scenario highlights the urgency for appropriate institutional structures to be put in place, capable of providing incentives to coordinate and facilitate productive and equitable water harvesting and enhance long term-viability of irrigation system

5. Collective Action and Role of Heterogeneity in CPR Management

The relationships between heterogeneity and natural resource management, particularly CPRs, have espoused a great deal of interest amongst academics and policy makers alike (Chambers, 1977; Wade, 1988 Ostrom, 1990; 1994; Lam, 1998).). The role of heterogeneity requires for some elaboration. Institution building for management of CPR involves collective actions from all members of the community managing resource in question. In the case of irrigation, it's the members of WUA The structure and composition of community and group heterogeneity/ homogeneity emanating from them has a wider implication for efficient and equitable CPR management (Agrawal, 2001; Oakerson, 1986; Poteete and Ostrom, 2004; Bromley and Cernea, 1989 and Arnold, 1998). Institution building, while managing CPRs involves collective actions from all members of the community managing resource in question. In the case of irrigation, it's the members of water users' association (WUA). It is argued that equitable resource distribution amongst the user memberships is vital for successful and sustainable CPR management. While the constraints imposed by heterogeneity is acknowledged, there is a considerable disagreement as to what constitute as heterogeneity and, the nature, trajectory and scale of their influence over natural resource governance remain grossly inconclusive (Adhikari and Jovett, 2006). The literature suggests two classes of difference in analysis the effects of heterogeneity in community based natural resource management. It is generally reported that a shared socio-cultural characteristics amongst the user groups involved in CPR management

provided much needed impetus for collective actions. However, other rational choice theorists argue that while shared socio-cultural features might provide some empathy for collective actions, those actions, however, are guided by economic interests. Cleaver (2000) argues that individual's motivation for involving into productive CPR management, economic motivations predominate. The users often evaluate cost and benefits for being associated for collective endeavours. If they are convinced that the likelihoods of benefits appropriation exceed the costs of involvement in CPRs management, then they have enthusiasm for undertaking collective actions. The embeddedness, of economic transactions in social life influence individual actions and perceptions in managing local CPRs (Granovetter, 1992). Homogenous socio-cultural characteristics coupled with shared economic interests make collective action easier (Jodha, 1996, Kant and Cooke, 1999 and Saxena, 2000).

Conversely, existence of group heterogeneity amongst the users imposes enormous challenges for collective actions. It is argued that diverse socio-economic interests and different perceptions regarding CPRs might lead to recurrent disputes amongst the users and may create factionalism (Fresson, 1979). There are two camps of scholars who posit quite contradictory line of arguments regarding the role of heterogeneity in CPR management. There are two competing schools of thought in natural resource management which deals with the effects of local level heterogeneity in community base resource management. The scholars belonging to those two camps, posit quite contradictory line of arguments regarding their role of heterogeneity in CPR management. The first argues that local level socio-economic heterogeneities impose constraints in collective action and institution building (North, 1990). Unless guided by rules, regulations and robust institutional arrangements, the diverse interests amongst the stakeholders has meant that defrauding and uncooperative behaviours are not uncommon (Kanbur, 1992; Kant, 2000; Bardhan, 1993). The extent to and confidence with which resource users co-operate depends on the level of trust that they maintain amongst themselves in during their interactions that take place while managing the commons. Seabright (1993) proposed a model commonly referred as *habit forming* cooperation model which demonstrates that co-operative actions emanate when stakeholders' trustworthiness is initiated and maintained thereafter. However, habit forming behaviours are unlikely to emerge in heterogeneous communities where diverse political and socio-economic interests prevail. This leads towards defrauding, uncooperative actions unsustainable resource utilisation and ultimately resource depletion resulting into *tragedy of the commons* (Hardin, 1968). Thus economic inequality and socio-economic heterogeneity are both causes and consequences of differential access to and command over natural resource bases (Kant, 1998). Political dominance of non-dalit elites over dalit and other indigenous caste groups has meant that the latter's influences over local natural resource governance is very feeble.

The second school of thought contends that group heterogeneity is conducive for governance of local commons and facilitates collective action for efficient utilisation and conservation of natural resource bases. Mancur Olson (1965) in his seminar book 'The Logic of Collective Action' argued that in heterogeneous communities, collective actions can prevail if stakeholders with most economic interests and powerful influence initiate collective actions. Collective actions are successful if initiated by privileged stakeholder(s) in circumstances where large start up costs are required for local resource governance (Baland and Platteau, 1996). The propensity to contribute individually by the privileged stakeholders for collective actions is for anticipation of a greater share of the returns from contribution per se which is also called 'Olson Effects'. It is argued that increasing socio-

economic inequality could provide incentives and espouse users' interests for voluntary contributions in the governance of local commons (Baland and Platteau, 1999). However, the *Olson Effects* have come under increasing scrutiny in last two decades or so. Baland and Platteau (1999) report that increase in the larger parties interests in resource management leads to decrease in interests of the small parties. In essence, the Olson Effects increases free riders problem in the provisions of public goods i.e. too many small parties enjoying on the efforts contributed by privileged parties. Based on a theoretical model Dayton-Johnson and Bardhan (2002) report a U-shaped relationship between group heterogeneity based on production functions. They assume that at higher degree of heterogeneity, the privileged members completely supply collective action while at lower level of group heterogeneity, shared common interests amongst the users are sufficient to provide social capital for undertaking collective actions. However, a growing numbers of political ecologists report that the role of social capital in CPR management is highly contentious (Bryant, 1992; Ribbot, 1999) positive contribution (Pretty, 2003) positive contribution argues that social capital entails a notion of *shared identity* and help establish *recursive relationship* amongst the CPR users whose actions and expectations are guided by a set of agreed upon rules contributing positively in overcoming collective action problems while (Durston, 1998). Social capital help ensure economic efficiency in resource governance by reducing transaction costs, controlling defrauding and dishonesty amongst the resource base users. Pessimistic views on the role of social capital on CPR management contend that internal differences, tensions and stratifications are always present in both horizontal and vertical networks of users imposing serious collective action problems. Peet and Watts (1996) argue:

'These tensions are occur not only at a given spatial scale, but also across geographic scales, and indeed resolving these tensions is important for building a more robust users' associations (p36)'.

Quite interestingly, Quiggin (1993) claims that the equity considerations in CPR management are seeking opportunities for the most deprived and marginalised community members. Successful natural resource management can co-exist with even in substantial inequities. Within heterogeneous settings, the privileged members might be deriving more benefits from the CPR resource bases, however, with a complete acknowledgement of consciousness of other members. This helps them formulate strategies retrospectively. Notwithstanding free riders problems, strong institutional arrangements, rules, regulations and appropriate guidelines for local resource governance can enhance collective actions (Ostrom, 1990).

6. Power Influence in CPR Management

As in any institutional arrangements, irrigation resource governance is inherently a political process and power (both formal and informal) plays a major role in crafting institutions. Any attempts to institutional analysis of irrigation governance should be viewed through the lens of power, process and practice and how these shape farmers' access, control and use of irrigation water. Robert Chamber (1977) posits:

--a central and universal issue in the distribution of irrigation water is who gets, what and where. This is the very stuff of politics and it is surprising that political scientists, political anthropologists and those who study political economy have not devoted more attention to it. Where water is scarce and often constraining and when individual farmers and

communities of farmers compete for it, the focus is on the processes of allocation and acquisition which determine the access of users to water (p345).

In resource governance, as Hasler (1993) argues that the mediation and expression of power hegemony essentially are reflection of the contestation and negotiation of interests amongst the stakeholders. Negotiations are essentially games of *give* and *take* which are ingrained between and within various levels of society. Asymmetrical information, insufficient knowledge, low participation along with unequal power distribution results into inequitable benefit appropriation from the local commons. This spreads wave of disincentives for collective actions and degradation of the natural resource bases are inevitable (Perez-Cirera and Lovett, 2006). However, the impact of power in CPRs management is very puzzling. Baland and Platteau, (1996) argue that greater control over production factors including control over labour, information and knowledge provides incentives to contribute more time, efforts for CPR management with beneficial effects to entire community. However, in their subsequent studies (Baland and Platteau, 1999) report that in pursuance of their private interests, the powerful and influential members can and quite often do eschew adherence to rules undermining collective actions and sustainable use of resource (Perez-Cirera and Lovett, 2006). I argue that, informal power (particularly ones emanating from issue based politics in caste based society) when penetrates into resource governance, the consequence is increased inequitable CPR governance. Nepal provides us with a fertile ground for investigating impacts of informal power that emanates from casteism which is biased against lower castes populace (the dalits).

However, it is quite difficult to find a completely homogenous community. Also, group heterogeneity does not guarantee collective actions and sustainable use of CPR bases. Often is the case that in any given community significant group heterogeneity exists. These differentiations emanate from multiple sources including varying interests, wealth inequality, level of education, employment status, network and links to village elites and so on. It is equally plausible that the group differentiations entail unequal power distribution which underpins use of and control over natural resources.

Importantly, what is the most worrying is that the owing to unequal power distributions and differential access to and control over natural resources, the difference between resource-rich and resource poor households is widening in proportion to the differential land ownership, water resources and lower rate of participation in resource governance (Vaniya and Taneja, 2004). Additionally, higher transaction costs as a proportion of the resource appropriating costs have immense bearings upon the welfare of asset-poor households (Adhikari and Lovett, 2005)

If policy interventions which are aimed at improving the livelihoods of rural poor often to the most vulnerable themselves widen the gap and maintain a cleavage (in terms of social, economic and power differentiations) between the rich and poor households, the urgency for critical examination of power relations and sound understanding of differentiations, while formulating policy interventions to support rural livelihoods and sustainable use of natural resources is eminent.

7.1 Irrigation Development in Nepal

Irrigational development is of special interests for a pre-dominantly agricultural country like Nepal where almost one-fifth i.e about 18 per cent of its total land area is utilized for agriculture (CARE-Nepal, 2001; CBS, 2004) and more than 76 per cent of the total population are engaged in agriculture for their livelihoods (Economic Survey, 2001/02) contributing to up to 40 percent of national GDP (Adhikari, 2001). Also, Nepal is the second richest country, only second to Brazil in the world in terms of its potential water resources with possession of about 2.27 per cent of the world water resources potential (CBS, 1999). A country report for Nepal's environmental statistics note that, altogether Nepal Comprises of about six thousand rivers having about 45 thousand kilometres in length (Kharel and Suwal,2001). However, despite being water-wealthy and having 30 per cent (14-17 per cent in 1997, in Pant, 2003), irrigation-based agricultural production, only 54 per cent (42 per cent in 1995/96) of the net cultivated land has access to some form of irrigation (NLSS, 2004 p3), while just 41 percent of the irrigated land receives year – around irrigation (Mishra and Bhattarai, no date).

7.2 Poverty Reduction and Irrigation Development in Nepal

Nepal is one of the poorest countries in the world with about nine million people (38 per cent of the population) are living under absolute poverty line (daily income less than one US dollar) (NPC, 2002). Nepal has Human Development Index (HDI) of 0.504, which is lower than all its South Asian neighbours except Pakistan (UNDP, 2004). Within Nepal rural poverty outstrips urban poverty. Rural poverty (44 per cent of rural population) is almost double than that of the urban settings (23 per cent of the urban population) (ibid, p2). The HDI for urban settings is 0.581, while for rural settings remain 0.452 (UNDP, 2004). For the project site district, the HDI is 0.450, less than the national rural settings. Also, the Human Poverty Index (HPI) records indicate that, rural human poverty exceeds urban poverty with HPI value being 42.0 and 25.2 respectively with national HPI remaining 39.6 (UNDP, 2004). The poverty intensity level and severity gap for urban are is 7.0 and 2.8 per cent respectively. The same measures, for rural areas remains 12.5 and 5.1 per cent respectively, while for overall Nepal it is, 12.1 and 5 per cent respectively (NPC, 2003 p25). The differences in poverty levels between rural and urban settings call for special attention due to the fact that, poverty in Nepal is predominantly rural phenomenon where, nearly 90 per cent population live and 55 per cent population undertaking agriculture for their livelihoods and remain below absolute poverty line, far too high than in any other sectors (NESAC, 1998). Thus it is imperatives to prioritise rural poverty reduction, particular in agricultural sector if poverty in Nepal is to be reduced.

7.3 Equitable Natural Resource Distribution

Nepalese agrarian relations are semi-feudal and capitalistic in nature where, land endowments are concentrated amongst rich peasants and landlords (SAAPE, 2004). Furthermore, unequal cultivable land and access to productive resources have reinforced towards high poverty level and continuation of semi-feudal and capitalism. Latest figures from Nepal Living Standard Survey indicate that a vast majority of the agricultural household rely on subsistence farming from small farms. About 45 per cent of small farmers operate in less than 0.5 ha of land, occupying 13 per cent of agricultural land while 8 percent of large farmers operate in 2 ha or more of land, occupying about 31 per cent of total agricultural land (NLSS, 2004 p 4). The concentration index for agricultural land is

0.50 (0.54 in 1997) reflecting a highly uneven distribution of land resource in Nepal (Pant, 2003; NLSS, 2004).

A vast majority of poor, landless and land-poor, undertake agricultural activities for their own consumption purposes and for landlords. In doing so, a significant proportion of agricultural households (about 28 per cent of which, 7 per cent are landless and 21 per cent operate in rented- land) work on crop share basis also known as *adhiya* (a system in which the total production is equally divided between farmers and landlords) or *tyahu* (a system in which, landlord and the farmer share two-third, and one third of the total production respectively) or some type of contractual basis (NLSS, 2004). However, in both *adhiya* and *tyahu* systems, production costs such as labour costs, cost of manures and so on are borne by the farmers themselves without any contribution from the concerned landlords. According to census 2001, about 25 per cent of the households are considered to be agricultural landless (with no land or owning less two *ropanies* of land). Landlessness is more acute among the Dalits, as out of all absolutely landless, 22 per cent are Dalits (Basnet, 2004). Amongst the Dalits, average landholding per household is 2.46 *ropanies* of *khet* (irrigated land) and 4.5 *ropanies* of *pakho* land (semi arid and rainfed land respectively). This has a major implication for food security. It is reported that more than 50 per cent of the Dalits have food deficiency (Dahal et.al, 2002).

Sharma et.al (1994) in their study of socio-economic status of dalits and indigenous tribes in Nepal noted that, food security amongst *dalits* is severely constrained. They reported that almost about 21 per cent *dalit* households, food grain produced in a year lasts less than 3 months. For 19.4 per cent of them, food grain lasted for 4-6 months, while 14.5 percent could grow food grain enough to consume for whole year. Only 5.1 per cent of them had surplus food grain production. Given these circumstances, it is important to evaluate whether the poorer households usually affiliated to lower castes are benefiting as much as the richer households usually from higher caste background in deriving benefits from irrigation canal development in Nepal or not.

8. Conclusions and Future Directions for Research

Using the lens of heterogeneity, this paper has attempted to flesh out how complex institutionalized social differentiation can result in inefficient use, inequitable allocation, and unsustainable use of irrigation canal water in Nepal. Further the paper has presented the case of irrigation development in the context of the dalit communities. The overarching aim has been to add knowledge on how social taxonomy (caste system) and socio-economic heterogeneity influence the efficiency in resource use, equity of resource distribution, empowerment and welfare of community members. It has illustrated how power relations emanating both from economic and social-based on casteism hinder/ facilitates collective actions. This will have major implications upon nature resource conservation and poverty reduction strategies through the development of irrigation infrastructure. It is aimed that this review would raise discussions for future policy directions for equitable irrigation development capable of optimizing welfare of poor people whose livelihoods directly or indirectly depends on agricultural activities. The paper has advocated for inclusive institutional structures for irrigation management that increase livelihood security of poor, landless, dalits and indigenous people in Nepal. This study will help better inform policy makers about institutional support structures that would facilitate more

equitable irrigation development at local level. The following research questions have been identified:

- a) What are the institutional mechanisms that govern the access to and use of irrigation water resources?
- b) What are the determinants of local management institutions? How institutions affect successful irrigation outcomes in terms of poverty alleviation?
- c) What are local economic consequences (equity and distributional issues) of irrigational canal at local level?
- d) Does local level heterogeneity (physical attributes of resource and both economic and social heterogeneity among resource users) obstruct the evolution of productive and egalitarian institutional arrangements at the community level?
- e) What is the role of power in influencing over institutional arrangement and benefit appropriations from CPRs in local settings?
- f) What are the additional institutional options that ensure increasing access of the landless, land-poor and dalits community members to local irrigation resources that ensure equitable and efficient irrigation management outcomes at the local level?

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